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[Communicated.]

Water Gas Tar.

The signal development of the water gas industry, since its advent to the present time, has evolved a significant factor in the manufacture of gas for illuminating and heating purposes. It has proven so successful that comparatively few gas works now rely entirely upon the destructive distillation of coal for their supply. In the United States alone over 300 plants are producing carbureted water gas only; and about 100 are producing both coal gas and water gas.

As long as the necessary oil is available, and obtainable at prices comparing favorably with gas coals, it seems we may look for maintenance of the present water gas plants, and for further installations, irrespective of new propositions for other methods by which to carbonize coal for obtaining coke and gas.

The extensive changes in the economics of gas manufacture have produced a comparatively new tar, which, during recent years, amounts to about 400 millions gallons per annum, and the volume is still increasing. At first gas managers were confronted with a serious problem for the quick disposal of this tar, the only outlet seeming to be to burn it under boilers and such like places. Manufacturing chemists, who are ever on the alert for working up new or waste products, soon found that water gas tar was valuable for distillation, as it yielded, under careful and proper treatment, products almost (if not quite) identical with those obtained from ordinary coal tar, as produced in the retort system of coal gas manufacture; and at the present time many millions of gallons are annually worked up in this manner.

The tar distiller has thus materially helped in the progress of the water gas industry; in fact, so much so, that the tar produced (almost valueless at first) at the present time commands a price per gallon not much less than that of coal gas tar, and it is now considered an important source of revenue to gas companies.

When water gas tar first become a commercial product it had to pass through the usual phases that attend any new product—prejudice, trial, adoption; and this took several years. After much controversy for and against it, water gas tar has been proven a commercial product of value, so much so that gas companies have little or no difficulty in disposing of all their production, mainly to tar distillers.

The process of manufacturing carbureted water gas, and the reactions involved, are well understood; particularly the chemical changes, which are recognized as the almost complete polymerisation of the paraffines into members of the olefiant and benzene series of hydrocarbons. These being, to some extent, held by the hot gases in mechanical mixture, give the illuminating property to the gas produced in the generator. A considerable portion, however, is condensed in the cooling apparatus to liquid form, in the condition of a brownish-black, syrupy liquid, known commercially as water gas tar. This product, which contains also condensation and "drips" from the whole apparatus beyond the carbureters, is a product rather variable in physical character, particularly in specific gravity and water content. Such tars have been met with the specific gravity of which varied from 1.020 to 1.120. The water content frequently gives much trouble, both to the gas engineer and the distiller, as its complete separation from the tar is a difficult matter, owing to the strong tendency to form an emulsion, in which water may be present to the extent of 30 per cent. to 40 per cent. In the larger gas works, where the most modern apparatus is installed and very large quantities of tar are produced, there is very little difficulty in obtaining a well dehydrated product.

Good water gas tar should not give over 0.5 per cent. water on distillation, but distillers tolerate up to 2 per cent. This is a point which should be more carefully observed by gas engineers, because the question of water content is a serious one for tar distillers, and it certainly is a factor in the determination of value. As an average of laboratory tests of a large number of water gas tars received from various gas works, the yield in volume has been:

Constituent.	Per Cent.
Water	1.25
Light oils	14.00
Dead oils	32.00
130° Pitch	52.75
	100.00

This laboratory average very fairly represents the actual works distillation of about 5 millions gallons in stills of 5,000 to 10,000 gallons working capacity.

The light oils, on re-distillation, yield about 60 per cent. of crude naphtha, of a quality fit for the refinery. The dead oils, when first run, are clear, bright and quite light in color, and do not so readily deepen to the very dark brown shade, as dead oil from coal tar does. The specific gravity of the bulk is rather lighter than the latter, ranging from 1.010 to 1.030, according to the quality of the tar and the method of distillation. Dead oil from water gas tar does not contain any "Tar acids," but these can readily be added, to produce an oil with any desired percentage. This addition of acid to the neutral oil makes it equal to any coal tar oil containing tar acids, resulting from direct distillation. This is not supposition, but a fact confirmed by

many years production and use, that many of the coal tar creosotes, containing over 6 per cent. to 8 per cent. tar acids, have been fortified by the addition of these acids. The laboratory distillations of water gas tar creosote, to which tar acids have been added, show very clearly that it is practically identical with creosote from coal tar containing the same percentage of acids. This will be shown and discussed in another paper in the near future.

Pitch from water gas tar is splendidly clean. It contains only a very small percentage of carbon and has a bright, clean, fracture. It is tough and elastic, being more on the order of asphalt than is straight coal tar pitch, which, owing to the present day tars, is rather a scarce article. Water gas tar pitch, properly made and of the proper melting point, is just as valuable and perhaps more valuable for roofing, roads, and waterproofing purposes than the so-called "straight coal tar pitch."

Water gas tar has certainly had an uphill fight to prove its value; but, year by year, prejudice is decreasing, and extended trials made with it and its products have proven so satisfactory that now it can hold its own with coal tar. Water gas tar probably will never reach the price paid for coal tar, mainly because of the absence of the coal tar acids and the lesser yields of pitch. It has, however, become a staple commercial commodity, and gas managers need have no fear for the disposal of all they produce. They should, however, avoid becoming arbitrary, because, like other crude materials, there is a limit to its value, controlled by the market for the products obtained from it. They should also remember that it is the tar distiller who has, against long odds, created the demand and given this unexpected revenue to the gas companies that produce water gas.

The Status of the Lighting Art.

[From the Address of MR. PRESTON S. MILLAR, President, Illuminating Engineering Society.]

* * * Because of conviction that a very useful purpose would be served by a record of the knowledge of the principles of illumination already attained, and by reviewing existing practice in the art of illumination, it has been thought advisable to undertake the compilation of facts to fix the status of the lighting art in the United States of America in the year 1913. The obstacles in the way of such an effort are, however, considerable. Variation in practice is so large as to make it impracticable to present a really comprehensive survey, and more numerous agencies than were available are necessary to obtain sufficiently intelligent and consistent records of practice in various parts of the country, and in the several branches of illumination. So, to present a fittingly authoritative review, a more accurate and detailed knowledge than the writer possesses is essential; but these obvious obstacles, however, were deterrents of too mild a nature to dissuade from an attempt regarded as desirable.

With a view to securing information regarding lighting practice, questions were prepared and sent (about the first of July) to representative individuals and commercial organizations of the following classes:

Central stations; municipal gas companies; engineers; ophthalmologists; school associations and commissions; street railroad companies.

Also, manufacturers of incandescent lamps.
" " " mantle burner lamps.
" " " arc lamps.
" " " acetylene supplies, tips, etc.
" " " oil lamps.
" " " small, isolated lighting plant equipments.
" " " gasoline, acetylene, etc.
" " " lighting glassware.

Fixture manufacturers.
Arc lamppost manufacturers.
Railroads.
Street lighting companies.

The country was divided into areas of approximately 1,000,000 population each, and, so far as practicable, lists of questions were sent to possible sources of information in each section of 1 million population. In all there were 128 questions, many being duplicates of questions appearing on other sheets. Approximately, 1,750 lists of questions were issued. The questions as a whole dealt with the recognized fundamentals of illuminating practice, though in all cases the attempt was made to adapt them to the knowledge which the correspondent was understood to possess.

Approximately 20 per cent. of those receiving the questions promised to supply such information as they possessed or could obtain, and information is being received daily. In general the later returns appear to be so well considered and so generally valuable as to make it appear undesirable to complete the summary without including the information which they contain.

In discussing the subject it is necessary to adopt some form of classification, if each department of knowledge and practice may be considered intelligently. It is possible, and it is perhaps customary, to classify with respect to the nature of the installation and of the premises illuminated. It seemed preferable in this case to classify according to those features which determine the success or the failure of the illumination, irrespective of the nature of the installation. Light should be of proper quality and the lighting equipment should be installed suitably. In the present state of our knowledge it is considered that illumination is satisfactory if correct in regard to certain qualities of light and to certain features of utilization. These it is presumed to present you as:

The Categories of Illumination.

Light.	Utilization.
Intensity.	Contrast.
Direction.	Congruity.
Diffusion.	Hygiene and safety.
Color.	Cost.
Steadiness.	

In the following discussions of the various qualities of light, features of lighting practice and corelated matters, the information, made available by the lighting survey described, has been combined with material obtained from other available sources, and the whole compressed into a brief review.

Intensity of Light.—Intensity is a quality of illumination which has received very general attention from the earliest days of illuminating engineering. Its importance was early recognized and led to the development of photometers for facilitating such study. Early writings on illumination rarely failed to include a table setting forth views as to the intensities which should prevail in various classes of installations. These statements were very largely restricted to the mean horizontal illumination at some height (usually 30 inches) above the floor, neglecting other important aspects, such as wall brightness. Yet emphasis upon intensity undoubtedly prompted increase of light in installations where it had been inadequate and tended to raise the standard everywhere. In many classes of lighting the intensity standard has been increased greatly within the last few years. Street lighting, very generally inadequate, has felt this advance. The use of more powerful illuminants, the growing appreciation of importance of lighting business streets well, and the influence of merchants' lighting systems for display, have operated to increase the standard of illuminative intensity, and in middle and better class stores a high intensity of illumination has been found to have a merchandizing value. In intelligently conducted industrial plants the influence of improved lighting upon output, as well as safety of employes, is evidenced in increased light intensity. In small factories, as in small stores, this improvement is less marked. Sign lighting has increased greatly, indirectly promoting increased intensity in street lighting. In residences the advance has been felt less than elsewhere.

The attitude of manufacturers of illuminants, with that of lighting companies, is an important element in determining the trend of practice in regard to intensities. Manufacturers of gas mantle lamps have been active in promoting the use of their product, displacing open flame burners with a large increase in intensity. It would appear that there is opportunity for gas companies to contribute largely to the improvement of illumination by more actively promoting the substitution of mantle lamps wherever open flame burners are still in use.

In the electric lamp field the manufacturers have exploited the mazda lamp widely, and their efforts have been seconded more or less by central station companies. In some cities the central station company has pushed the use of the lamp actively, with very beneficial results, while in other cities they have not taken an active part in making this improvement available to their customers. An indication of the extent to which the mazda lamp is now employed is found in the sales' records of lamp manufacturers, which show that, for the 3 months, May, June and July, 1913, the sales of lamps are as follows:

Type.	Per Cent.
Gem and carbon	37
Mazda	63

When it is remembered that each mazda lamp lasts 2 or 3 times as long as a carbon lamp, it will be seen that their use has now become very general.

The following sales' records of lamp manufacturers furnish interesting evidence upon the increase in light intensity standards.

Year.	Approximate Average Candle Power of all Incandescent Lamps Sold.
1906	18
1907	19
1908	21
1909	23
1910	25
1911	26
1912	29
1913 (estimated)	32

Standard practice in regard to light intensity depends upon conditions other than simple illumination requirements. The standards vary in installations of similar class in different cities. In some cities "Whiteway lighting" has been found to militate against successful show window lighting, the street light of higher intensity being considered to illuminate the show windows sufficiently for ordinary purposes. In other cities similar installations have increased the intensities employed in show window lighting, it being found that, in contrast to the lighting of the street, more light is necessary to make the window displays as prominent as they were when the street lighting was inadequate.

In few classes of installations is it practicable to measure the advance in light intensity throughout a period of years, for while representative data may be available for modern installations, very generally they are lacking for the older ones. In railway car lighting there is an opportunity to measure the progress made, due to the fact that the older cars, with antiquated lighting systems, are continued in service on branch lines long after their type has become obsolete. A record of the average illumination intensities typical of the several systems of lighting which have been used in the lighting of day coaches is as follows:

Day Coach Lighting.

Installed During	Description of Illuminants	Average Horiz. Foot-candles 30 inches Above Floor.
1850 to 1875	Oil lamps—2 wicks feeding 1 flame	0.5
	—annular wick	1.0
1875 to 1900	Pintsch gas—4 fishtail flames	1.5
	—4 mantle cluster	1.65
1880 to 1900	Carbureted gasoline—center draft	1.3
1900 to date	Electric—50-watt opal tip lamps and flat reflectors	1.4
	50 watt clear lamps and satin finish bowl reflectors	3.0

Typical illumination intensities for artificial lighting of certain classes are indicated in the following table:

Typical Intensities of Artificial Illumination.

Class.	As Measured Through.	Foot Candles. Average.	Usual.	Range.
Street lighting:				
Principal streets in cities	Horizontal plane of street surface	0.4	0.25	2.0
Important side streets	" " " " "	0.15	0 1	0.25
Residence streets	" " " " "	0.04	0.01	0.10
Store lighting	Horizontal plane 30-inch above floor	4	2-6	..
Show window lighting	Plane of trim	18	12 25	....
Factory lighting	Horizontal plane 30-inch above floor	3	2-6	....
Office lighting	" " " " "	3	2-4	....
Residence lighting	" " " " "	1.5	1 3	....
Railway car lighting	" " " " "	2	1-3	....

Daylight illumination in interiors is perhaps 5 to 10 times as intense as that provided by our usual artificial lighting. As the artificial lighting is improved, attaining greater merit in respect to diffusion, the tendency appears to be to increase intensities. Latest experiments seem to indicate it is not improbable that, when we attain to more complete knowledge of the principles of good illumination, we shall find the intensities of illumination of interiors by daylight will have to be approached by artificial light in order to satisfy the requirements. It is further apparent that, as appreciation of the beautifying opportunities in illuminating engineering grows, aesthetic considerations impose requirements for greater light production; thus, the requirements of ocular hygiene and of aesthetics combine in demanding production of more light than was formerly required to provide acceptable illumination. The growing appreciation of the importance of good lighting is raising the standard, making a still further demand for the production of more light.

Direction of Light.—Direction of light has not received the same extended consideration that has been given to some other features of the illumination problem. It is forced upon attention, however, in certain classes of work where improper direction brings annoying shadow or glare. In general, artificial lighting is provided from ceiling fixtures in the center of rooms or bays, though wall brackets are often used alone, or as supplementary to center lighting, which involves a downward direction of the utilized light. Where the ceiling is employed as a secondary source, as in indirect lighting, engineering thought seems to favor designs which will very largely preserve a downward direction for the light. Daylight illumination of interiors, on the other hand, is very generally from side windows, and the lighting has a strong component almost horizontal, though the direction is usually slightly downward.

One of the earliest evidences of appreciation of the importance of proper direction in lighting is the well-established tradition that in reading "The light should come from over the left shoulder." Many of the tenets of illuminating engineering, though unrecognized in the formulation of this precept, are evident as the underlying causes. It was the outgrowth of reading experience, when reading was done with the aid of a single illuminant in a room; namely, an oil lamp. It indicated conditions for reading which avoided shadow and glare, and best contributed to the ocular welfare and comfort of the reader. Under certain conditions of use, which obtained when one or more members of a family read by the aid of light from an oil lamp, the portability of the light source, and the freedom of the reader to choose any desired position, made compliance with the precept entirely practicable. Modern conditions, involving immobile light sources and fixed positions for a number of workers in the same room, complicate the problem, and demand a much higher measure of adroitness for its successful solution. Indeed, were proper direction of light the only possible solution, as is implied by the ancient precept just quoted, the problem in many cases would be very difficult.

Recently, question has been raised as to the general propriety of downward light and arguments have been advanced in favor of light from the side. It is quite possible that in the near future developments in illuminating practice may result in less general adherence to a downward direction for light. In store and office lighting, reflectors designed to redirect the light downward are employed very generally. Only 15 to 25 per cent. of stores and offices employ illuminants without auxiliaries of some kind. In many of these exceptional installations the lamps are placed so near the ceilings that a general downward direction of light is obtained, in spite of the absence of redirecting auxiliaries. Of the 80 per cent. installations which employ lighting auxiliaries, probably four-fifths, or about 65 per cent. of all installations, employ some device designed to direct the light where it is most useful. Direction of light is so intimately associated with diffusion in contributing to the merit of an installation, that its further consideration may well be included under this caption.

Diffusion of Light.—Diffusion of light in earlier discussions of illumination problems was often regarded simply as a quality secured by an effort to conceal light sources and reduce their intrinsic brilliancy. Its influence upon the appearance of a room, and of objects

in it, was recognized, and its importance from the ocular standpoint was often considered, though not fully appreciated. Its importance as an element contributing to the reduction of sharp shadows completed the list of recognized effects of diffusion. Larger experience in illuminating practice, and more recent experiments and research, have brought about an increased appreciation of the importance of diffusion as one means of diminishing glare from reflecting surfaces, and promoting ocular welfare in general. This increased appreciation of diffusion is perhaps the most notable development in the knowledge of illuminating engineering during the past 2 or 3 years. A few years ago the cry was for efficient reflectors to direct the light downward, increasing the horizontal illumination intensity for a given light production, or decreasing the amount of light necessary to provide a given illumination intensity. Now such reflecting devices, while regarded as useful, are recognized as inadequate, unless some means of providing a fair measure of diffusion is employed. Thus the use of mat reflecting surfaces is growing. Where diffusion is lacking, multiplicity of sources is of some assistance, since in some cases glare may be overcome by increased intensities of light from other directions. Multiplicity of sources, however, means multiplicity of shadows.

Extremes of diffusion are rarely required. Too much diffusion means characterless illumination and may mean eye fatigue; too little diffusion involves glare. The degree of diffusion which characterized even the better lighting installations of a few years ago is now recognized as inadequate. "Semi-indirect" and "indirect" lighting succeeded in many installations because of their higher degree of diffusion. In general, latest developments suggest that most of our existing methods of diffusing have merely mitigated the evils growing out of exposed, brilliant, small-area light sources. It is important to know if diffusion of light necessarily involves the production of more light. Obviously light cannot be diffused without loss in efficiency, although some have felt that with diffused light a lesser intensity is satisfactory. Tests have been reported which purport to establish this point, but it is doubtful if such is the case. With a correct degree of diffusion it is entirely practicable to determine what intensity of light is most satisfactory for a given purpose. With improperly diffused light the same intensity of light is unsatisfactory. This has been taken to indicate that proper diffusion of light results in a decreased intensity requirement, and when the diffusion is inadequate the lighting cannot be satisfactory with any intensity. When subjects who are being experimented upon are told to increase the intensity until the illumination is satisfactory in order to compensate for the lack of diffusion, it is not unnatural that the result should be a report that intensity increased by a certain percentage compensates for the lack of diffusion, giving rise to the conclusion that increased diffusion permits decreased intensity. It is submitted that such an effect has not been demonstrated, and there is no reason to suppose that insufficiency of diffusion can be supplemented in any other way than by increasing the diffusion. Each increase in light diffusion has brought with it the necessity for increasing the light production, in order to compensate for the loss in efficiency involved in the diffusion. In ⅓ to ½ of the total installations reported upon, certain degrees of diffusion have been obtained, either through the employment of diffusing globes, depolishing inner surfaces of reflectors or by means of indirect lighting.

Color of Light.—Modification of light to produce desired colors has been very generally employed in recent years for decorative purposes. The ends to be achieved have been more or less clearly defined, but the means to be employed have in general received too little attention. Color in lighting has been the agent of the artist rather than of the physicist or the engineer, and in its employment empiric rather than scientific methods have been followed.

The art of illumination seems to be upon the verge of a marked advance, due to appreciation of the possibilities of color manipulation. Illuminants are available, ranging in color from the neon tube, through the Moore tube and the metallic electrode arc, to the mercury vapor lamp. Among incandescent light sources, there is offered a narrower (though material) range of color values. The employment of these variously colored illuminants in conjunction, to produce color effects, is inherently costly and troublesome, and likely to be practiced only in special cases; but the use of differently colored illuminants for commercial purposes is beginning to be appreciated. In a few drygoods stores, small area lighting by illuminants which simulate daylight, has been provided. The modification of the light of many or all of these illuminants to secure light of desired quality is a field which, now largely uncultivated, offers opportunities of which the illuminating engineer is beginning to avail himself. For many purposes we aspire toward light of the color of daylight. The earliest successful illuminant for this purpose, namely, the Moore carbon dioxide tube, produced light of practically the desired quality. Later efforts in the modification of light of electric incandescent lamps, incandescent gas mantle lamps and intensified carbon arc lamps, have attained some measure of success. It is understood that all these forms of artificial daylight have come into use to a limited extent, though the low efficiency of all is a deterrent preventing their application upon a large scale. We appear to be upon the verge of developments in arc lamps which are likely to result in relatively high efficiency illuminants, of color values so near to daylight, that it would not be surprising if the slighter modification of light, which would be entailed in order to produce artificial daylight, would be accomplished with a loss which would not reduce the efficiency of the lamps below the practicable limit; and which, therefore, might result in artificial daylight illumination upon larger scales. Meanwhile it is becoming increasingly apparent, that for certain purposes, as the lighting of residences, ballrooms, etc., white light is not acceptable under existing conditions. Having become accustomed for generations to the employment of light in which the long wave lengths are more accentuated, we have either adapted ourselves to that condition, or there is some quality inherent in its application which makes it more satisfactory for social purposes than white light. The amber mantle, as a substitute for the ordinary mantle employed in gas lighting, caters to this peculiarity, and renders the gas mantle lamp far more acceptable for certain purposes, and there is reason to believe that the light of the tungsten filament lamp might be modified to advantage to produce a more acceptable color for social lighting. Attention is being given to these matters, and it is reasonable to state that the art is upon the verge of developments which, within the next few years, will extend employment of color in lighting, and that lighting auxiliaries will be developed along lines that will yield a wide variety of tints with minimum loss in efficiency.

Steadiness of Light.—Steadiness of light is so important a fundamental that most modern illuminants employed in indoor lighting are free from serious objection on this score. Among outdoor lamps where the requirement for steadiness is less rigorous, light which is relatively unsteady finds employment more readily. Among such are, in varying degree, arc lamps and the flame illuminants, including open flame gas lamps and some types of gas mantle lamps when exposed to wind, but in modern types of gas lamps this difficulty is reduced. Among arc lamps the flaming arc is particularly unsteady. Improvement in the steadiness of all arc lamps is effected when the current density at the electrodes is increased, and the tendency to operate these lamps at higher currents is noted elsewhere and brings greater stability in addition to higher efficiency.

In incandescent electric lamps fluctuation is another form of unsteadiness of light. Under some conditions it has been found practicable to operate incandescent lamps upon 25-cycle alternating current circuits, but this frequency is about the lower limit, and sometimes the flicker of lamps so employed is objectionable. Arc lamp operation upon 25 cycle current is impracticable where good lighting is a desideratum. In general, steadiness of light is so obvious a fundamental that a degree of unsteadiness which becomes obtrusive is rarely tolerated.

Contrast.—This, here regarded in a comprehensive sense, is a most important factor in the utilization of light. Exposed light sources within the field of vision, giving too great contrast with the surroundings to which the eye is adapted, are detrimental to vision. One of the earliest canons of illuminating engineering branded exposed light sources as the cause of ocular discomfort and, under extreme conditions, of impairment of vision. The development of more powerful and more brilliant light sources has emphasized the importance of this principle, and reduction in the specific intensity of light sources is recognized as a means of mitigation. Tables of specific intensity of various light sources were prominently featured in the earliest discussions of illuminating engineering. The low specific intensity, for example, of the Moore tube was urged as one of its chief merits. But that the exposure of light sources was not generally recognized as a serious menace to eyesight and a source of discomfort are attested by the designs of lighting fixtures and glassware. Catalogues of lighting equipment of the leading manufacturers at that time show designs which in the light of our present practice appear almost barbarous in their defiance of this first principle. A number of causes and effects differing materially in character have been classed as

glare, without proper distinction as to their nature. The study of glare and the evil effects, in so far as these are concerned with the exposure of light sources, received a notable impetus in the early years of this Society's history, particularly glare as an agent which diminishes visual power. Following upon the discussion of glare in the sense here considered, there came a more general appreciation of the advantages of concealing light sources. Leading manufacturers of lighting appliances discontinued some of the worst-offending designs, and the newer designs evidenced more care for this aspect of the problem. While on all sides one finds evidence of continued neglect of this important fundamental, yet we may feel that, at least by lighting practitioners, there is a thorough understanding of the serious nature of exposure of light sources. It is now generally recognized that entire concealment of the light source (as in indirect lighting), reduction of its brilliancy by diffusing media (as in much of the direct and "semi-indirect" lighting), or the removal of the light source from the ordinary field of view, is an essential to good lighting. Flat reflectors, which exposed the light source, are being replaced by bowl reflectors which conceal it from ordinary view; manufacturers of gas lamps report growing use of diffusing rather than clear globes; manufacturers of electric lamps report increasing use of frosted lamps; the use of indirect and "semi-indirect" lighting fixtures is growing rapidly; new installations of street lamps are very generally mounted higher than was the practice a few years ago; the proportion of bare lamp installations is growing steadily less.

There has been much discussion concerning the effect of light or dark walls upon ocular comfort. The apparent disagreement between the conclusions reached by various investigators appears to be explained by noting that, if intensities are inadequate for proper vision, dark surroundings reduce visibility; while, under conditions of adequate intensity, light surroundings may promote good vision. Illustrating by any extreme case chosen from street lighting conditions, it is noted that street surface and buildings of low reflecting power result in greater contrast with illuminants in the street, than do surfaces of relatively high light reflecting power, and this greater contrast results in glare and reduced visibility. Passing to the other extreme, in a brilliantly lighted room, of which the decorations are of relatively high reflecting power, the intensity upon the surfaces viewed is higher, because of the more advantageous reflections, and the contrast in general, between the light sources and the general surroundings, is lessened. With dark surroundings the specific intensities of light sources must be kept lower than with light surroundings. Exposed light sources of the more usual types are more brilliant than is the sky, the surroundings are apt to be less bright under artificial light than they are in the day time, and greater contrasts prevail in artificial lighting. In the better lighted installations, however, improvement is now being effected by reduction of the specific intensity of the sources and increase in the brightness of the surroundings.

Glare from reflecting surfaces, due to the specular reflection, is occupying much thought of investigators and practitioners. This also involves the question of contrast. Indeed, all manifestations of glare are but little more than improper contrast. A printed page of glossy paper may give rise to a serious condition of glare, due to specular reflection. This means that one views the imperfectly reflected image of a light source which, in contrast with the surroundings, is of excessive brightness. The result is ocular discomfort. If glossy ink has been used in printing, it may be difficult or even impossible to discern the imprint. This is a case in which the excessive specular reflection, which causes discomfort by too great contrast with the surroundings, is complicated by too little local contrast to permit of reading the glossy black letters, which reflect specularly almost as well as the surrounding surface of the paper. This element of contrast is receiving a fair share of the attention it merits, and our knowledge of the principles involved is growing rapidly. In general, therefore, it may be said that improper contrast, which manifests itself as glare, either due to exposed light sources or to reflections from specular surfaces, is being brought under control in installations that receive illuminating engineering attention. The lesser degrees of difficulties involved in improper contrast are, however, not so thoroughly understood or appreciated. Our knowledge appears to be in need of considerable extension, and our practice appears to suffer from lack of proper care for this important feature of the utilization of light.

Congruity.—The past 2 or 3 years witnessed marked increase in general appreciation of the importance of the aesthetics of illumination, and it is becoming generally recognized by lighting practitioners that lighting equipment, as well as the illumination produced, must be in harmony with the character of the premises illuminated. In the early development it was natural that the physical and engineering aspects should receive attention first, for these underlie the art. It was natural that these first developments should show incongruities. This period of illuminating engineering is now being outgrown, and the art is approaching the period of adolescence, in which the acquirement of knowledge is rapid, and preparation for mature effort is the keynote. At this time it is appreciated that congruity in the utilization of light in any installation is a desideratum of first importance. It is just as inartistic to locate highly embellished, ornate and inefficient fixtures and glassware in a machine shop, as to hang tin shades in a drawing room. Error, however, occurs commonly in the use of improper lighting equipment where artistic design is required, and it is in this aspect of general practice that one of the great needs for improvement is apparent.

It is recognized that the illuminating engineer should be conversant with, and appreciative of, art in its several phases, if his work is to reveal in an intelligent, sympathetic manner the best of the design. Some instances are encountered where only the artist can do justice to the requirements. In such cases the illuminating engineer should be guided by the artist, but he ought to be able to accomplish the desired end more effectively, and at a lower cost, than can the artist. The latter knows what he desires, but presumably has not familiarized himself with lighting technique to an extent which enabled him to accomplish this purpose as well as can the engineer. It is believed that the events of the past two or three years have contributed toward a somewhat better mutual understanding, and that in the very near future we shall enjoy a fuller measure of the needed hearty co-operation, thereby achieving improvements in the artistic phases of illumination which are so much needed.

In this connection it may be noted that a most important factor in the betterment of artistic illuminative conditions is the design of stock fixtures and stock lighting auxiliaries. Any given type of fixture must, of course, be designed for one set of conditions, and cannot be expected to be congruous in a wide variety of installations; but it may, however, be made tasteful in itself, free from objectionable features, and well adapted for general use under average conditions of the class for which it is designed. When considering the artistic aspects of illumination, it is not well to restrict thought to individual designs, which, of course, are expected to surpass stock fixtures, being at once more pleasing and congruous. It should be remembered that a 5 per cent. improvement in stock fixtures, affecting large numbers of people, may be of much greater value than a 100 per cent. improvement in a distinctively designed installation. Residences and some other classes of installations are equipped very generally with fixtures which cannot be approved from an artistic, hygienic or efficiency standpoint, and this is particularly true of installations which date back 5 years or more, being especially true of combination fixtures. These fixtures are barriers to the improvement of residential lighting conditions, and a first step toward a general improvement in such lighting should be the wholesale replacement of these fixtures. This is a crying need of the time, but the way of accomplishing it is not clearly indicated.

It is fortunate that displacement of incongruous lighting, by equipment suitable from the artistic or efficiency standpoint, brings about automatically an improvement from the standpoint of ocular welfare. If the requirements for artistic and hygienic equipment were diverse or incompatible, the situation would indeed be difficult.

Hygiene and Safety.—In ordinary lighting practice the qualities of illuminants are such that laws of hygiene are rarely transgressed. Considerable has been written regarding unsanitary effects of various illuminants, but it is usually found that such articles are the work of the press agent of some manufacturer or promotor of rival illuminants. Ordinarily, ventilation is sufficiently good to avoid deleterious effects from noxious gases, and most artificial illuminants are not sufficiently strong in the ultra-violet light to be injurious. The quartz mercury vapor lamp is perhaps an exception, but the heavy glass globe invariably used with it is sufficient protection. On the other hand, the use of light promotes sanitation in securing greater cleanliness wherever it is applied; likewise, the more liberal, judicious use of light promotes safety, and that is being recognized in the industries by the larger and more progressive corporations, special attention being devoted to promoting safety by the use of light. Of much greater importance is ocular hygiene, since it is not from some deleterious quality of the light yielded by a particular

kind of illuminant that harm to the eyes results, but rather in the misuse of light, irrespective of the illuminant. The efforts now being made to promote the correct use of light, in the home and in the school, are of incalculable advantage to the public in safeguarding the eyes of children during the period of immaturity, when they are more susceptible to the ill effects of misuse of light. Ocular hygiene is being investigated in a number of laboratories. Generally, conditions of visibility are judged by means of determination of the threshold visibility value, which involves the determination of either minimum light intensity for visibility, minimum size of object viewed, minimum contrast which can be perceived, or of the time-element in the perception of objects at the threshold value. While it perhaps remains to be determined how far the results of such investigations may be considered applicable to practical lighting conditions, undoubtedly the information made available by such investigations, is advancing the science of ocular hygiene and contributing largely to knowledge of the principles of good lighting. Further research effort is necessary in which the combined efforts of illuminating engineers, ophthalmologists and psychologists shall govern the nature of the investigation, and there is need of the application of the results of such investigation to practical lighting conditions. Conditions appear to be such as to warrant the assumption that the next few years will witness considerable advances along both these lines.

Costs.—It is usually considered that the cost of artificial lighting consists chiefly of three elements: First, cost of lighting equipment; second, cost of maintaining equipment, including interest, depreciation, etc.; third, cost of fuel or energy required for operating the system.

The cost accounting in illumination work is well handled in larger organizations, and possible efficiency is, therefore, considered intelligently. Much lighting, however, is not organized, and the expense is borne by those who do not handle accounts intelligently and who are not in a position to judge of the ultimate efficiency which may be obtained by the employment of the several available systems.

Artificial lighting is inefficient; due, first, to the low efficiency of energy transforming devices; second, to the low light production efficiency of illuminants; and to this in many cases must be added unintelligent utilization of light. In spite of its low efficiency, however, the cost of artificial lighting is small. The following lighting costs are suggestive in this connection:

Class of Lighting Installation.

Small wage earners' homes; ratio of cost of lighting to total income, 1.0 per cent.

Well conducted large manufacturing establishments, which are well lighted with modern illuminants; ratio of cost of artificial lighting to total cost of output, exclusive of selling expenses, ½ to ¼ of 1 per cent.

Large retail mercantile establishments; ratio of total lighting cost to total sales, probably less than 1 per cent.

Small stores; ratio of total lighting cost to total sales, 2 per cent.

Modern loft buildings, 1 to 2 per cent.

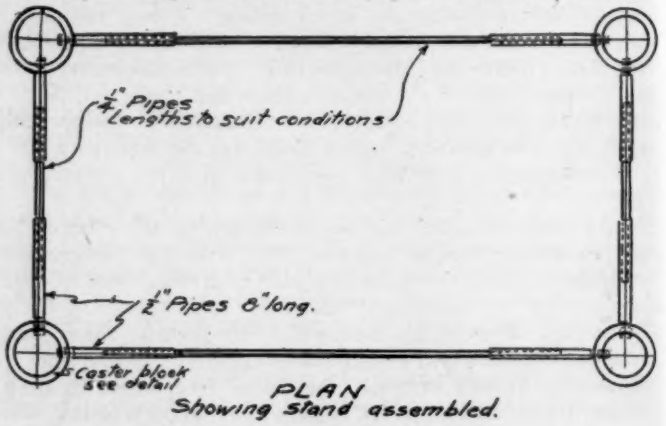
Street lighting appropriations by municipalities are of the order of 60 cents to $1 per inhabitant per year. In comparison with the benefits conferred in added commercial advantage and extended opportunities in education, social life and recreation, the cost of artificial lighting is remarkably low.

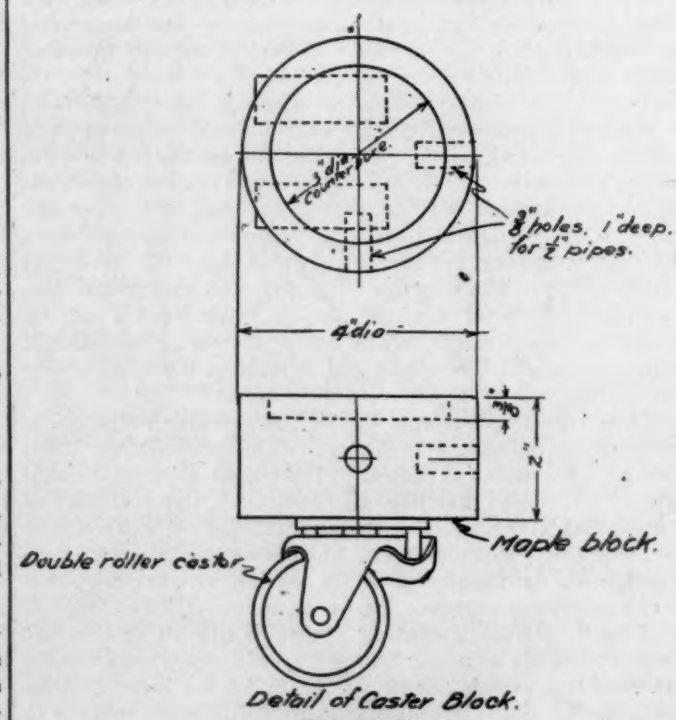
The cost of artificial lighting has been rapidly reduced by the development of improved illuminants, and the greater economies which have been effected in manufacture and operation. This reduction in cost has been largely automatic and the outgrowth of economic conditions, and doubtless it will be still further reduced in the near future.

With the reduction in the cost of lighting has come betterment in lighting conditions, for much that is advanced in the lighting practice in this country is due to the progressively enterprising manner in which manufacturers of illuminants and lighting companies have conducted their businesses. Only to an extent so small that it is negligible has the decrease in the cost of lighting been effected through legislation. Recently, however, in a few cities recourse has been had to rate legislation, in consequence of which relatively low rates have been imposed. These low rates imposed, dictated often by political rather than by economic motives, constitute a menace to the success of this Society's work in so far as it affects the public. Only when corporations engaged in supplying lighting service earn a fair return upon their investments can they be expected to continue operation along broadly progressive lines, and only while such policies prevail among manufacturers of lighting appliances and in the management of lighting companies, can we hope for progress in the further improvement of lighting conditions. Commercial organizations have great potentialities for good, and we can rely upon a continuance of their assistance, only if the further reductions in the cost of lighting are effected in accordance with the development of the economic situation rather than in accordance with the artificial conditions of political regulation.

Wrinkles Contributed to Last Meeting, Pacific Coast Gas Association, by Editor H. W. Burkhart.

No. 1.—*Appliance Stand*, by Frank Wilson.—This consists of a very simple, cheap and durable stand for mounting appliances in the display room. It also serves as a truck to easily move appliances around, and it can be adjusted to meet all conditions. The stand consists of maple disks, 4 inches diameter, by 2 inches thick, countersunk 3 inches by ¼ inch. At right angles to the disks are holes, bored 1 inch deep, into which holes ordinary black pipe is inserted, the whole being assembled as shown in sketch. Double roller casters are mounted on the bottom side of the disks.

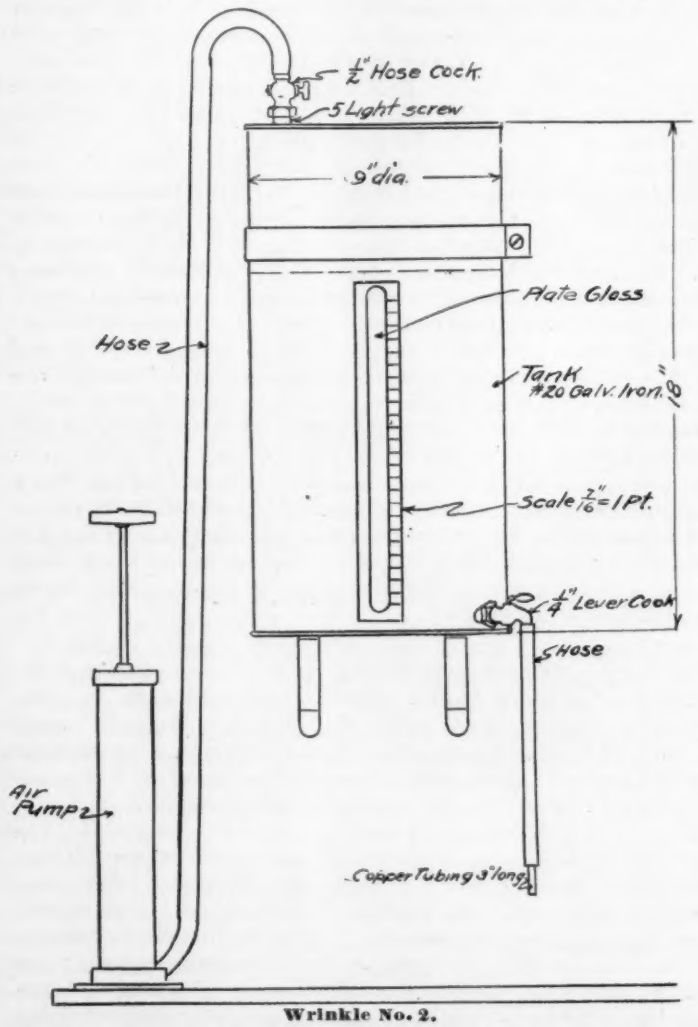




Wrinkle No. 1.

No 2.—*Measuring Tank for Oiling Gas Meters*, by W. H. Partridge.—This comprises a tank made of No. 20-gauge, galvanized iron, 18 inches high and 9 inches in diameter. Inserted in one side is a gauge glass, made of heavy plate glass, 10 inches long and 2 inches wide, which is set in a frame, carrying a scale marked on one side for measuring the amount of oil to be used for each meter. The divisions in the scale are 7/16 inch apart, which equals 1 pint of oil. The tank is to be filled with oil to the top of the glass, which would equal a volume of about 3 gallons. The remainder of the tank is for

air pressure, supplied by an ordinary automobile air-pump, through an ordinary air-hose, such as used in a garage or bicycle shop. On top of tank is a 5-light meter screw, taken from the side pipe of a



Wrinkle No. 2.

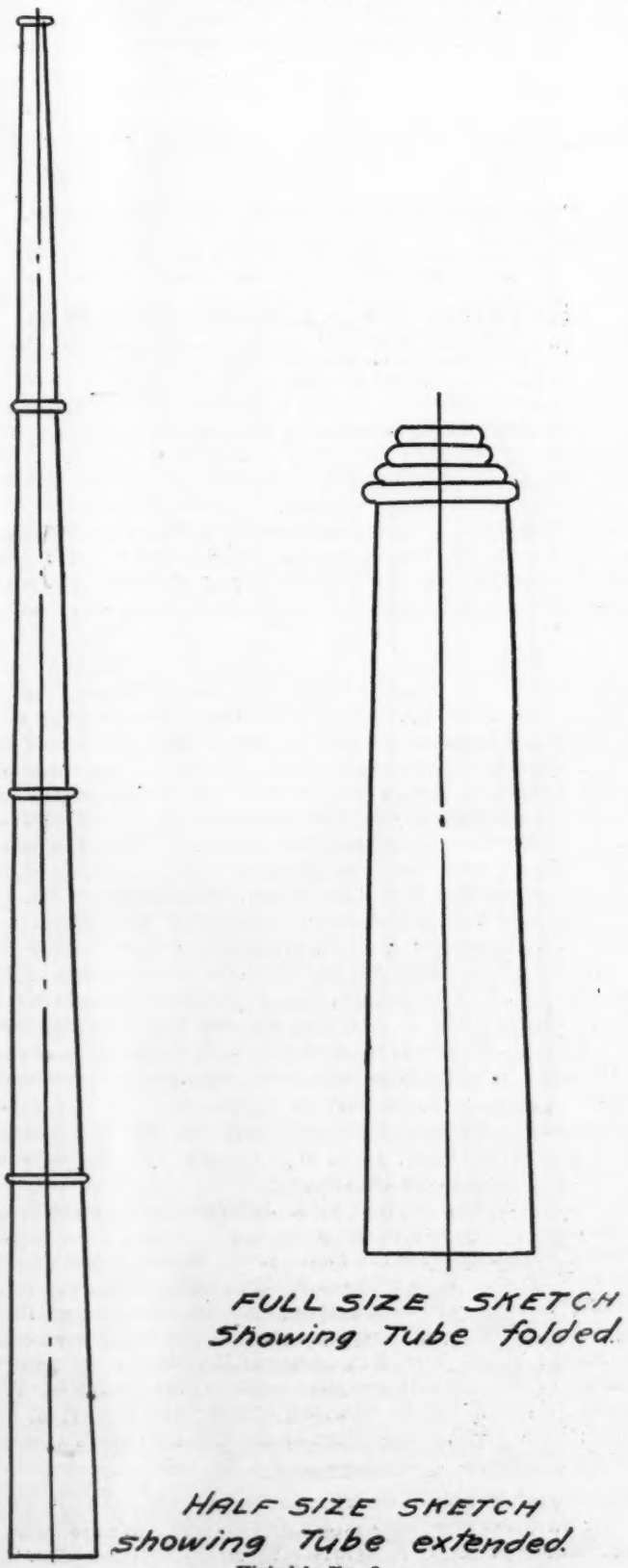
meter, with a tubing cock screwed in for attaching the air hose. At bottom of tank is a ¼-inch lever cock, having a short piece of air hose attached. The end of the hose carries a piece of copper tubing, about 3 inches long, the end of which tubing is inserted in the holes, punched on either side of the side pipes on the outer side of the meter. By turning the lever cock the required amount of oil can be forced in the meter without any waste whatever. With the aid of this device a 5-light meter can be oiled in about 25 seconds, whereas the pouring in of the oil takes over a minute. We find this device one of the most economical and essential things used in our meter shop. However, were we to make another, we would use a regular water gauge glass in place of the plate glass.

No. 3.—*Superheated Steam for Oil Gas Generators*, by J. F. Creighton.—In most oil gas plants steam is used for injecting oil into the gas generator, the quantity of steam depending upon the amount of oil to be used. It was thought that, if this steam could be superheated, without additional cost, a saving would be made. To that end a coil of pipe was arranged, inside the gas off-take pipe, or generator standpipe, as close to the generator as possible. After passing steam through this coil we were enabled to get a 50° superheat from the heat of the generated gas passing through standpipe on its way to washbox. The result was a material saving in fuel oil used for heating.

No. 4.—"*Benso,*" *or Distillates, Obtained from High Pressure Gas Mains for Use in Auto Trucks*, by Mr. J. F. Creighton.—In the drippage, from our high pressure mains, we obtain an oil which, when distilled, is used for fuel in our auto trucks. The still used for distillation is made from a 24-inch tee, around which is built a furnace. It has a capacity of 200 gallons per day, and 4 cents per gallon would easily cover the cost of operation. The fuel used for this still is muck from the washboxes of our oil gas generators. The product, after distillation, is termed "Benso," and has a gravity of 45° B., and a flashing-point at room temperature. We are using this "Benso" very successfully in our automobile trucks, by the use of a gravity raising device, before the carbureter, which is obtained from automobile supply dealers.

No. 5.—*Hot Air as Conveyor for Fuel Oil Under Furnaces Where Steam is Not Made*, by J. F. Creighton.—As the excessive expense of the use of compressed air, at atmospheric temperature, for injecting oil for fuel purposes is well known, it was thought possible to obviate it by heating the air after compression. This was done by setting a coil (approximately 100 feet) of inch pipe, cut in 6-foot lengths, in part of furnace that would keep temperature of air at approximately 450° F. The results obtained were very gratifying.

No. 6.—*Collapsible Leak Tube*, by D. E. Keppelmann.—We have



Wrinkle No. 6

(*Continued on page 234.*)

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NEW YORK, MONDAY, OCTOBER 13, 1913.

BRIEFLY TOLD.

LOCAL COMMITTEE OF ARRANGEMENTS, RICHMOND MEETING, AMERICAN GAS INSTITUTE.—Through the courtesy of Mr. W. P. Knowles, General Superintendent, the Richmond (Va.) Municipal Gas Works, we are enabled to herewith give the personnel of the local committees:

Arrangements.—Messrs. W. P. Knowles, F. L. Marshall, Alvin M. Smith (President, Business Men's Club); R. L. Peters (President, the Common Council); J. C. Corley (Chamber of Commerce).

Reception.—The Governor and Mrs. Mann; the Mayor and Mrs. Ainslee, Hon. T. M. Carrington, Col. and Mrs. Archer Anderson, Mr. and Mrs. H. L. Cabell, Mr. and Mrs. H. Christian Clarke, Mr. and Mrs. George Gibson, Col. and Mrs. Barton H. Grundy, Mr. and Mrs. W. P. Knowles, Judge and Mrs. L. L. Lewis, Mr. and Mrs. F. L. Marshall, Mr. and Mrs. R. H. Meade, Mr. and Mrs. Clyde H. Ratcliffe, Judge and Mrs. D. C. Richardson, Mr. and Mrs. W. H. Parrish, Judge and Mrs. R. Carter Scott, Miss. J. B. Knowles, Mr. and Mrs. G. R. Lorraine, Mrs. B. B. Valentine, Mr. and Mrs. J. C. Corley, Mr. and Mrs. W. T. Reed, Mr. and Mrs. Eugene Clowes, Miss Ella Fehsenfeld, W. P. Knowles, Jr., Mrs. F. W. Scott, Mr. and Mrs. E. C. Laird, Mr. and Mrs. E. J. Willis, Mr. and Mrs. Alvin M. Smith, Mr. and Mrs. R. L. Peters, Mr. and Mrs. W. T. Dabney. In addition we are given the following particulars respecting the social programme:

Wednesday.—Reception by the City and Chamber of Commerce, parlors of Jefferson Hotel, 8 P.M., to be followed by a musical entertainment and dance in the auditorium.

Thursday.—Annual banquet, 8 P.M., Jefferson Hotel; theater party for the women folks, and supper party.

Friday.—Luncheon for the ladies at the House of the Country Club, of Virginia. With automobile rides; guides to various points of interest in and about Richmond on the three named days. In the reception line, Wednesday evening, the order will be: Governor and Mrs. Mann; Mayor and Mrs. Ainslee; Mr. Walter R. Addicks, President of the Institute, and Mrs. Addicks; Mr. and Mrs. W. P. Knowles; Mr. and Mrs. H. Christian Clarke; and Hon. T. M. Carrington; Mrs. Clarke, Chairwoman of the Local Women's Committee of Arrangements.

TRANSPORTATION ARRANGEMENTS, DECEMBER (PHILADELPHIA) MEETING, THE NATIONAL COMMERCIAL GAS ASSOCIATION.—We are indebted to the attention of Mr. B. J. Kellum (Chairman) for these official details: The Trunk Line, New England Passenger, South Eastern Passenger and Central Passenger Associations have authorized reduced rates for the Philadelphia meeting—these Associations cover practically all of the States (excepting Wisconsin) East of the Mississippi river. The special train movement will consist of one from New York to Philadelphia, and one from Pittsburgh, the latter composed of special cars from Cleveland, Detroit, Chicago and St. Louis. The special train out of New York will be in charge of Mr. H. B. McLean, Consolidated Gas Company of New York; the special car from Cleveland in charge of Mr. F. R. Hutchinson, East Ohio Gas Company; the special car from Detroit in charge of Mr. A. P. Ewing, Detroit Gas Company; the special car from St. Louis in charge of Mr. John J. Burns, Laclede Gas Light Company, St. Louis; the special cars from Chicago in charge of Mr. J. E. J. Mayer, of Chicago; and the special car from Pittsburgh in charge of Mr. A. P. Brill, Pittsburgh, Pa. The New York train will leave that city Monday afternoon, December 1st. The special cars from Cleveland, Detroit, Chicago and St. Louis, leaving their respective cities, the afternoon of Sunday, November 30th. The Detroit car will stop en route at Toledo, and the St. Louis car at Terre Haute, Indianapolis and Columbus. The Pittsburgh special train will leave that city early Monday morning, December 1st, and will stop at Harrisburg. Both the New York and Pittsburgh trains will reach Philadelphia about 4 P.M., affording ample time for registration and securing hotel accommodations before dinner that evening. A folder, containing full particulars of the reduced rates authorized by the Passenger Associations, and the itinerary of the "specials," and Pullman rates, with return postal cards for reservations, will be mailed to members of the Association about a month prior to the meeting.

NINTH ANNUAL CONVENTION, EMPIRE STATE GAS AND ELECTRIC ASSOCIATION.—The Ninth Annual Convention of the Empire State Gas and Electric Association was held in the United Engineering Societies Building, 29 West 39th street, New York, October 2d, with about 120 delegates present. At the morning session President C. G. M. Thomas reviewed the work of the Association during the past year and suggested a series of four mid-year meetings for the coming year. The report was well received by the members, and its recommendations were referred to the incoming Executive Committee for further consideration. Following Mr. Thomas, the Chairmen of the various committees submitted their reports. For the Electric Meter Committee, Mr. C. G. Durfee (Chairman) reviewed the improvements made in meters during the past year and called attention to a recent order of the Public Service Commission which practically prohibited the use of demand or ampere-hour meters. He noted the increased favor with which ampere-hour meters were viewed abroad, and suggested that the Executive Committee should take up with the Commission the advisability of a modification of the order so that, if satisfactory types of these meters were placed upon the market, they could be used. Mr. J. T. Hutchings, Chairman of the Committee on Electric Vehicles, urged the necessity for more charging stations throughout the State, if touring in electric cars was to be made popular. Mr. Arthur Williams, Chairman of the Committee on Conservation, told of the work done by his Committee during the previous year. Mr. A. D. Dudley and Mr. T. R. Elcock, Jr., outlined the proposed advertising campaign of the National Commercial Gas Association, and Mr. J. M. Wakeman spoke of the plans of the Society for Electrical Development. The members voted their general approval of both of these plans, and instructed the Executive Committee to give them further consideration. Before adjournment was taken for luncheon invitations were given, by the Consolidated Gas Company, to visit its model department, and by the New York Edison Company to visit the show rooms on West 42d street. Luncheon was served in the banquet rooms of the Engineers' Club, and Chairman Decker and Commissioner Maltbie addressed the members informally. Chairman Decker's subject was "Public Service by Private Corporations." He spoke of the potential competition under which the companies operate, consisting largely of the possibilities of the use of substitutes for their service, and said that the Commissions were interested in the welfare of the companies furnishing the service as well as the rights of those who purchase it. He thought popularizing the service would be an aid in the solution of many of the problems which confront the companies. Commissioner Maltbie had selected as his subject "The Advantage of Public Utilities," and, in a humorous vein, referred to the advantages which gas and electric companies had over those selling other commodities. He also called attention to their responsibilities, due to the fact that they were selling necessities, and told the delegates that a matter of primary importance was to gain the confidence of the public. He believed that the situation in this

respect had improved during the 7 years that the Commissions had been in existence, but urged even greater publicity than had been common in the past. Following these addresses the members showed their appreciation of the presence of the Commissioners by a rising vote. After luncheon the meeting reconvened and listened to an interesting talk on "Accident Prevention," by Mr. James B. Douglas, illustrated by lantern slides. In the discussion Mr. Noonan (Rochester) and Mr. Strickland (Long Island City), showed a number of slides illustrating the work done by their companies. Mr. Bruce E. Loomis read a paper giving valuable suggestions on "Fire Prevention," using the lantern to show tables of statistics. A paper was presented by Mr. C. H. B. Chapin on "The Future of Association Work," in which a plan was suggested for preventing duplication of effort on the part of associations, and for accomplishing better results. Following this the Nominating Committee submitted its report and the following officers were elected:

President.—Mr. J. T. Hutchings, Rochester.
First Vice-President.—Mr. J. C. DeLong, Syracuse.
Second Vice-President.—Mr. E. H. Palmer, Geneva.
Treasurer.—Mr. Stuart Wilder, Mount Vernon.
Secretary.—Mr. C. H. B. Chapin, New York.
And as *Members of Executive Committee, to Serve 2 Years.*—Mr. C. G. M. Thomas, Long Island City; Mr. H. M. Beugler, Poughkeepsie; Mr. C. A. Graves, Walton.

The convention then adjourned.

NATIONAL ADVERTISING.—Mr. Louis Stotz, Secretary of the National Commercial Gas Association, reports 15 new subscribers to the National Advertising Campaign, since the last issue of the "Bulletin." He also predicts that this campaign will lead to increased business and better business as is the opinion of all wide-awake, up-to-date gas men. Wherever the matter has been discussed before a State Association, or any other meeting of gas men really interested in the commercial side of the business, it has been approved. The Michigan Gas Association, which met on September 17 to 19, at Detroit, unanimously endorsed the campaign, a great deal of enthusiasm was shown, and the hope expressed that the advertising would appear in the national magazines, at an early date. Great Britain is starting out on a new campaign, and in our own country the Society for Electrical Development is about to start its advertising, and it behooves gas men to be very busy in the near future, or else to merit criticism as being behind the times, and allow gas to again suffer under the unjust accusation of being only nearly modern.

WISCONSIN COMMISSION ADVISES AGAINST MILWAUKEE MUNICIPAL LIGHTING PLANT.—The lighting committee of the Milwaukee City Council some time ago asked the Wisconsin Railroad Commission to investigate their street lighting conditions, and advise, among other things, what it would cost to properly light the streets from a municipal plant; and what would be fair rates at which to purchase the lighting. The Commission, after exhaustive examination, has reported against a municipal plan, showing that it would cost nearly $50,000 per year more, than if bought from the Railway and Light Company. While the figures are, of course, based on local conditions, the findings are of general value, because they point out a practical way for determining equitable rates for street lighting service, and a safe and sane method for investigating a proposition to establish a municipal plant.

UNIFORM SPECIFICATIONS FOR BOILERS.—So many States have enacted laws covering boiler inspection and boiler tests, and so many of these laws are in conflict on points of more or less importance, that the American Boiler Manufacturers' Association sees the necessity of some nearly uniform specification. At the recent meeting in Cleveland, the need of action was dwelt upon, and these recommendations for specifications presented as a basis for discussion:

That boilers be built on a factor of safety of five, of uniform steel, and that this specification cover flange steel.

That the steel be marked with the heat number instead of the brand, and that it have a minimum tensile strength of 60,000 pounds, and be subject to the bending and quenching test; and that it have phosphorus not to exceed 0.03 per cent., sulphur not to exceed 0.04, and manganese 0.50.

That weldless, crowfoot type braces be used, of the same steel as the plate, that they be figured on a basis of 7,500 pounds per square inch of section in the brace, and that on this basis no brace be used containing more than 1.28-inch area of section.

That through braces, either above or below the tubes, be weldless and be figured on 7,500 pounds per square inch of area.

That all seams be butt strapped with inside and outside covering strips.

That all manholes be 11 by 15 inches.

That no plates be used in a tubular boiler thicker than $\frac{5}{8}$-inch.

That all holes for rivets be punched $\frac{1}{4}$-inch small, and reamed to size.

That all flues holes be punched $\frac{1}{4}$-inch small, and reamed to size.

That no cast iron be used in the boiler, for reinforcement or any other purpose.

That all plates be bevelled on a planer instead of sheared on a bevel shear. (A demonstration on a 9/16-inch plate shows that it is impossible to do a good job on a splitting shear, and that the same objection that exists to a punched hole applies to the use of a splitting shear on thick plate; that is, that the metal is distorted by it).

The water column connections all to be $1\frac{1}{4}$ inch.

This action of the Association is to be highly commended, and its consummation will be of benefit to all users of steam generators.

UTILIZATION OF COAL.—At the meeting last month of the British Association for the Advancement of Science proper utilization of coal was treated as a matter of extreme importance to the future. Dr. Beilby spoke of low temperature distillation of coal as furnishing valuable products now consumed to small purpose, while yet leaving the most valuable part of the fuel for its ordinary use. It was the task of the gas works to organize the market for this low-temperature coke. Dr. Colman called attention to the fact that 25 per cent. of the heat units in the coal could be obtained as gas, 5 per cent. as tar, and 50 per cent. left as coke, while expending 20 per cent. in carrying on the process; and noted the fact that the tar was worth more for its products than as fuel, and that 20 per cent. of the nitrogen in the coal is recovered as ammonia. Dr. Lessing augmented Dr. Beilby's lesson by showing that in England there is an annual loss of more than 200,000 tons of liquid fuel carried away as soot, enough to supply the whole fuel oil demand of the British Navy. The fuel oil recoverable from house coals by low-temperature coking would amount to some 3,000,000 tons a year. The discussion left a powerful impression of the awakening to the possibilities of the coal supply. It is worth noting in this connection that the use of water gas is declining in England, owing to the better methods of coal distillation and the increased price for enriching oil.

CURRENT MENTION.—

AT the September meeting of the Board of Directors of the American Gas Institute the following named gentlemen were designated a committee to nominate officers for the Institute the coming year: Mr. E. S. Pratt (chairman); and Messrs. W. Cullen Morris, J. A. Norcross and John Gribbel; alternates, Messrs. E. G. Cowdery, T. R. Beal, W. H. Fulweiler, Peter Young and W. H. Snow.

MR. H. H. GANSER, Chairman Publicity Committee Illuminating Engineering Society, informs us that the October meeting, Philadelphia Section, will be held in the Engineers' Club, 1317 Spruce street, at 8 P.M. the 17th inst. The programme details a joint meeting with the Photographic Society of Philadelphia; an address by the incoming Chairman, Prof. G. A. Hoadley; a report respecting the recent Pittsbugh convention, by Mr. W. J. Serrill; and a paper by Mr. Steadman on "A Single Unit-Method for Measuring the Intrinsic Activity of Flame and Surfaces, and for the Practice of Photography." This paper will be presented by Prof. A. W. Goodspeed. The sessions will be preceded by a dinner, served in the dining room of the Engineers' Club.

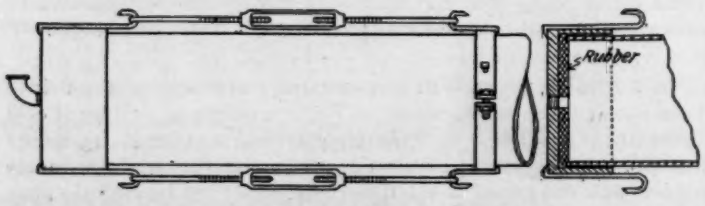
"OF course, you know that Mr. Wm. M. Lewis has resigned the place of General Manager to the Rockville (Conn.) Gas and Electric Company, to accept the position of Manager to the Grand Rapids and Muskegon (Mich.) Power Company. In addition to the Rockville job Mr. Lewis was prominently identified with the Stafford Lighting Plant of the Willimantic Gas and Electric Company, and the Rockville and Willimantic Lighting Company. We are very, very sorry that he goes from us; but, to paraphrase the rather funereal quotation, 'Our loss is his gain.' He will make his headquarters in Muskegon, and we all wish him the very best of good luck. Mr. M. J. Warner will act as General Manager of the Young & Warner lighting interests in and around Rockville, Willimantic and Stafford, and Mr. David McCormick, for the past 6 years its Cashier, will act as Agent for the Rockville Gas and Electric Company.—DAVIS."

MR. PETER ENGLISH, of San Francisco, has been granted the franchise to construct and operate a gas plant in Palacios, Texas. The grant is for 40 years, provided that construction work is begun within 1 year and completed within 6 months from the time such work is commenced.

(*Continued from page* 231.)

several inspectors whose duty it is to follow up reports of leaks in streets. They had been carrying short lengths of ¼-inch pipe to insert into the sewer inlets, manholes, openings in streets, etc., for the purpose of locating leaks. The pipe was rather cumbersome, therefore, we use the collapsible tube, which folds up and is easily carried in the pocket, thus being a very compact and handy instrument for the work.

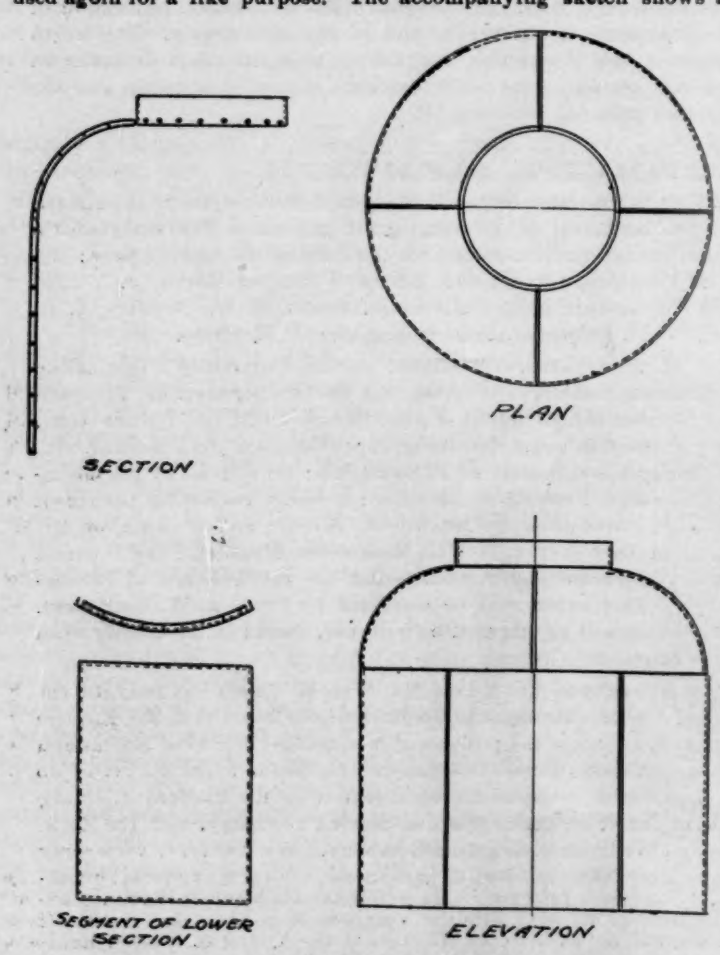
No. 7.—*Testing Cap on High Pressure Work*, by D. E. Keppelmann.—For the testing of high pressure mains it has been necessary to use the greatest care in bolting on a blank flange or head, together with the necessary barricading, which was a long and tedious job and



Wrinkle No. 7

not always certain as to its absolute security. Instead, a testing cap is placed over the end of the main, bolted by a lag screw to the main being tested. It is always ready, easily adjusted, and is absolutely secure.

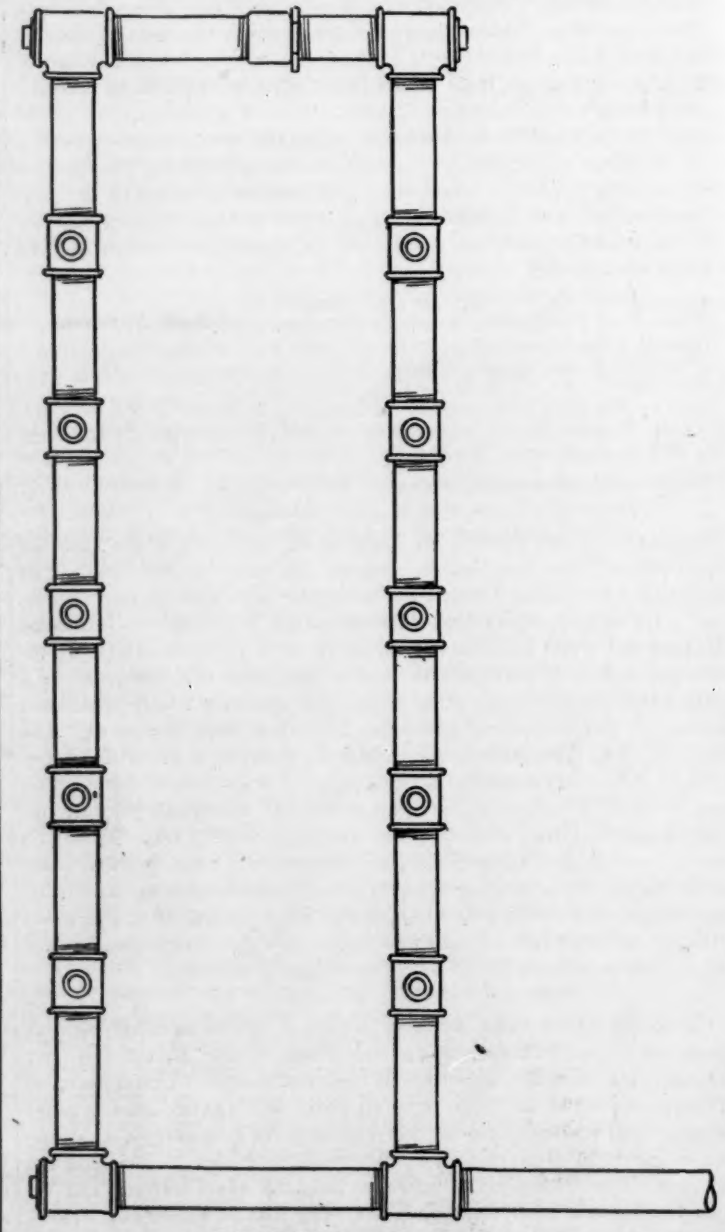
No. 8.—*Concrete Pit Form*, by D. E. Keppelmann.—With the installation of concrete pits for the housing of district governors, it was necessary, in each installation, to build a wooden form, at considerable cost for labor and material, and after the completion of the pit the wood invariably had to be thrown away, or at least could not be used agoin for a like purpose. The accompanying sketch shows a



Wrinkle No. 8

collapsible pit-form, made of corrugated iron, in 6 sections. After the hole is dug in the street the form is bolted together in a few minutes and set into position, and after the concrete is set each section is quickly unbolted and removed, and is again ready for the next operation.

No. 9.—*Welded Distributors*, by D. E. Keppelmann.—On sketch 9-A the distributor is shown with outlets to meters. On large services (3 inches to 4 inches) these fittings are very expensive, and the labor required to cut the necessary nipples and fit them together makes a distributor an exceedingly expensive installation; 9-B

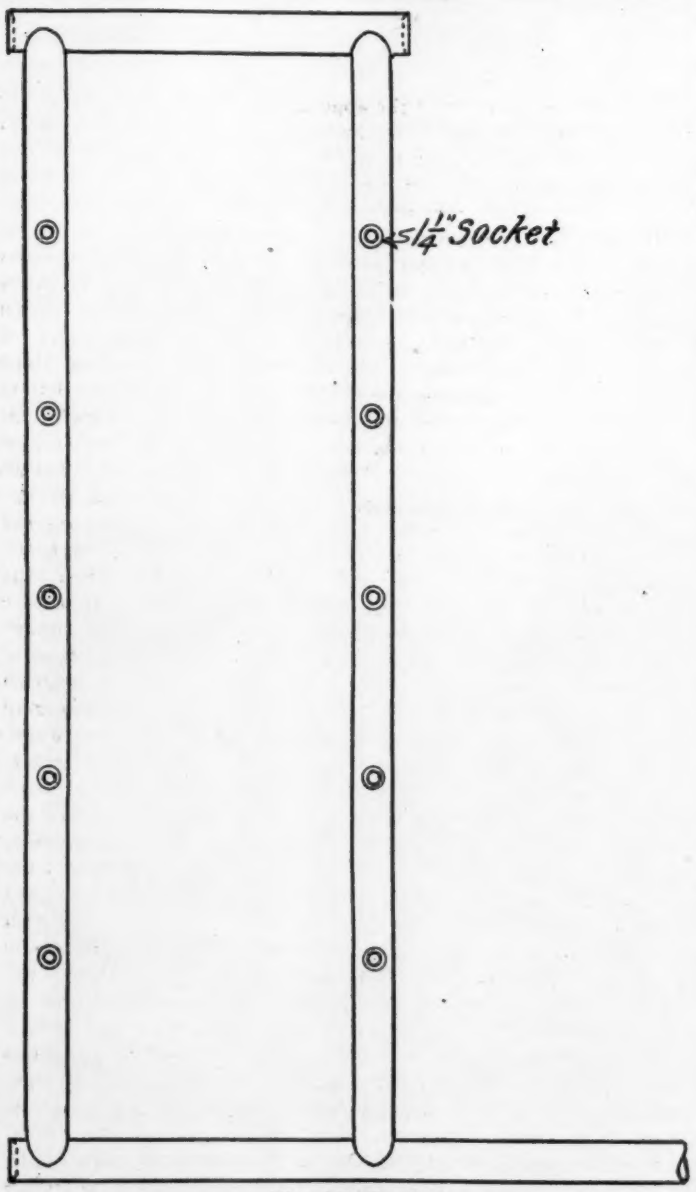


Wrinkle No. 9-A.

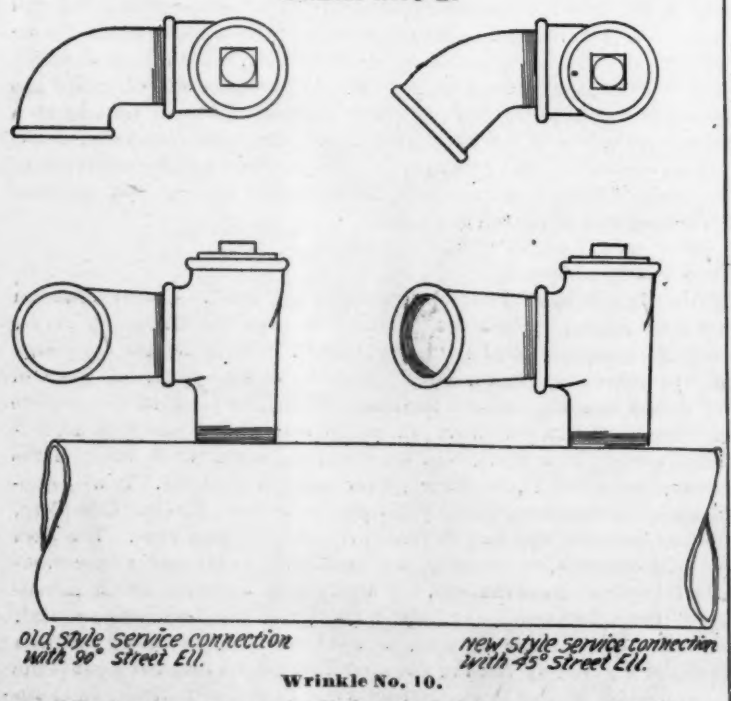
shows the same distributor, with pipes welded together, and holes burnt into the pipe and socket, and welded for outlets to meters. The saving on fittings and labor is 50 per cent., and the device makes an absolutely permanent installation. The welding is done by the oxy-acetylene process.

No. 10.—*Service Connection*, by D. E. Keppelmann.—The old-style service connection consists of a street tee inserted in the main with a 90° street ell. This brought the flow of the gas at right angles, causing stoppages at times. The 90° street ell has been eliminated, and in its stead we now use a 45° ell, making the flow more direct.

No. 11.—*Emergency Gas Stopper for Mains*, by D. E. Keppelmann.—Sometimes it becomes necessary to replace a 3-inch or 4-inch main with a larger size. A hat flange is found, providing outlet only for the smaller size main, necessitating the replacing by a larger hat flange, to give an outlet for the larger main. In order to prevent the flow of gas without necessitating bagging off the main, a piece of heavy rubber (of sufficient size to cover the opening) is rolled and inserted through the opening, with a string attached. The pressure of gas unfolds the roll of rubber, and, blowing it against the opening on the inside, is held there until the larger opening is made and the new hat flange is bolted on. This has been used very successfully, an



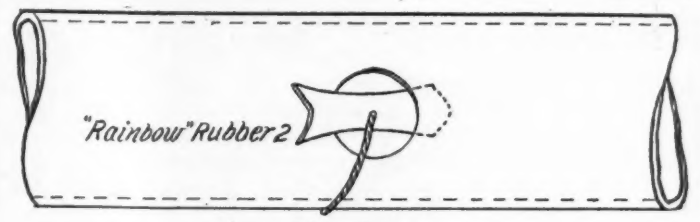
Wrinkle No. 9-B.



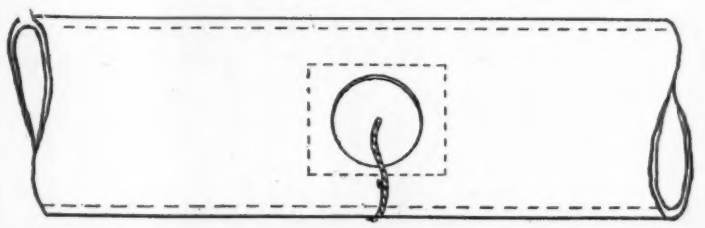
Wrinkle No. 10.

has eliminated a great many difficulties which occur in an operation of this kind.

No. 12.—*Rubber Stopper for Service Connections*, by D. E. Keppelmann.—Frequently we receive an order for the installation of a service on existing 2-inch mains, which necessitates cutting the main and inserting a tee in the line. To prevent the loss of gas and annoyance to our customers, as well as to overcome any possible danger to the fitter, the cut in the main is made and a 2-inch rubber stopper, with a string attached, is placed in each end of the cut main, stopping the flow of gas. The main is threaded, the tee inserted, and the stopper withdrawn by pulling the strings through the outlet of the tee.

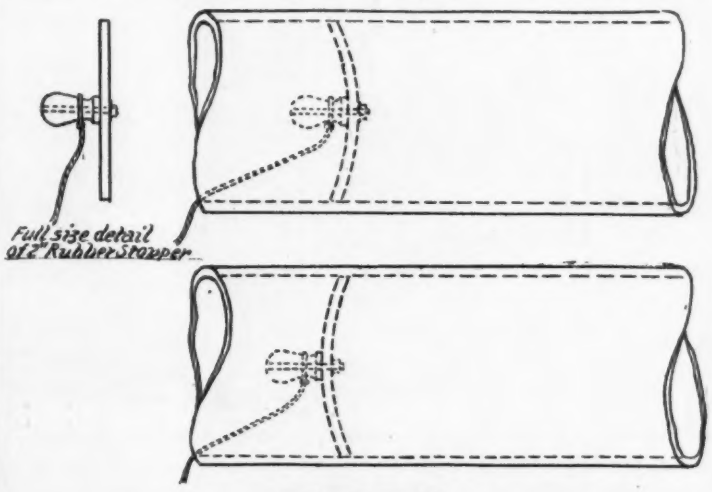


Inserting Stopper



Stopper in position

Wrinkle No. 11.

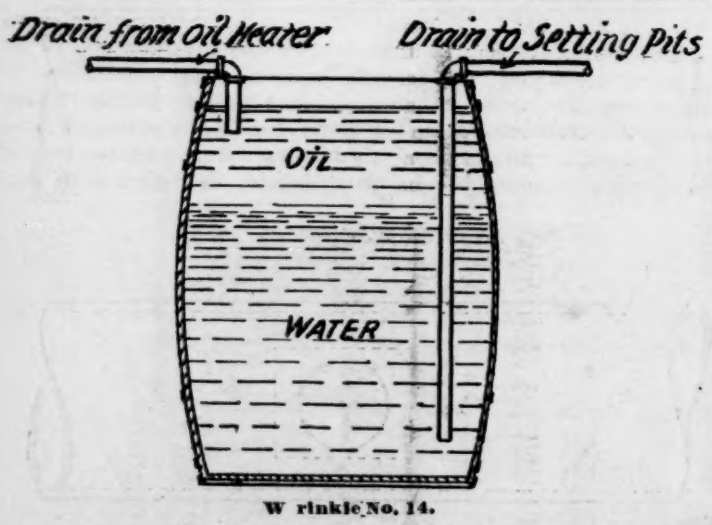


Wrinkle No. 12.

No. 13.—*Shutting a Valve Under Hot Water*, by D. W. Connell.—In order to put a foot valve on the suction of our circulating water pump, it was necessary to shut off the water from the settling pits to the well. The valve used for this is a common irrigating gate, the top of which is about 20 inches under water in the last pit. In some way the gate had been pulled out of the guide slots, and we could not get it back in place without using our hands to guide it. As the water was too hot in which to work, we were up against it until the thought occurred that, if we put a piece of pipe down in the water directly over the valve, and turned cold water down it, a man's arm could be inserted through this pipe. The force of cold water running down the pipe kept the hot water away from the man's hand, which was below the pipe. We used a piece of 6-inch stove pipe and a ¾-inch hose.

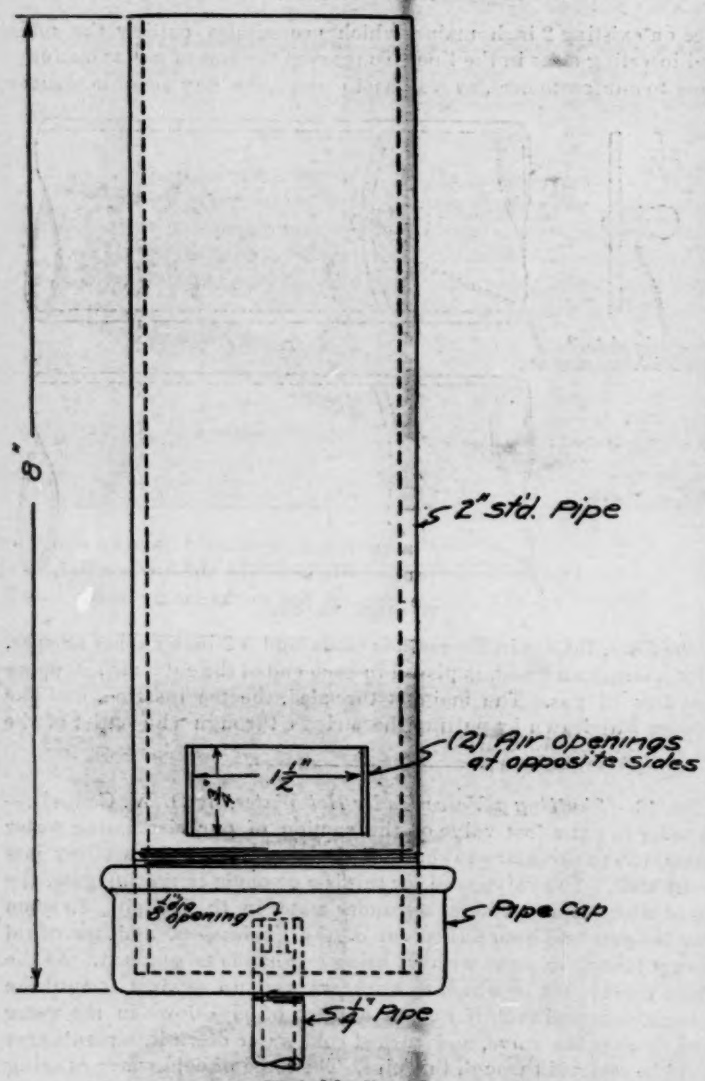
No. 14.—*Oil Seperator*, by D.W. Connell.—Our oil heater began to leak, and enough of it ran through the drain which goes to the settling pits to make a mess on the water. To avoid this we put a barrel on the ground, as per sketch, and, by dipping the oil out of the barrel about once a week, we had no more trouble.

No. 15.—*High Pressure Gas Burner*, by D. W. Connell.—While running a 7-inch suction line from the circulating water pump, and after having two pieces screwed up, we found it would be necessary



Wrinkle No. 14.

to bend the pipe. We, therefore, constructed the burner as per sketch. The bend was made directly over a 10-inch gas pipe. We



Wrinkle No. 15.

raised the 7-inch pipe a few inches and covered the gas pipe with dirt, placing a brick on top of the dirt, with a piece of iron on the brick to keep from crushing it. We then laid some old firebrick around the 7-inch pipe, about 12 inches apart, to form a sort of furnace to hold the heat. Five minutes after the gas was lighted we had the pipe bent.

THE authorities of La Grange, Georgia, have awarded contracts for much of the apparatus that is going into the municipal gas plant at that point. The generating apparatus and the purifying system will be furnished by the Gas Engineering Company, of Trenton, N. J., F. D. Moses, President.

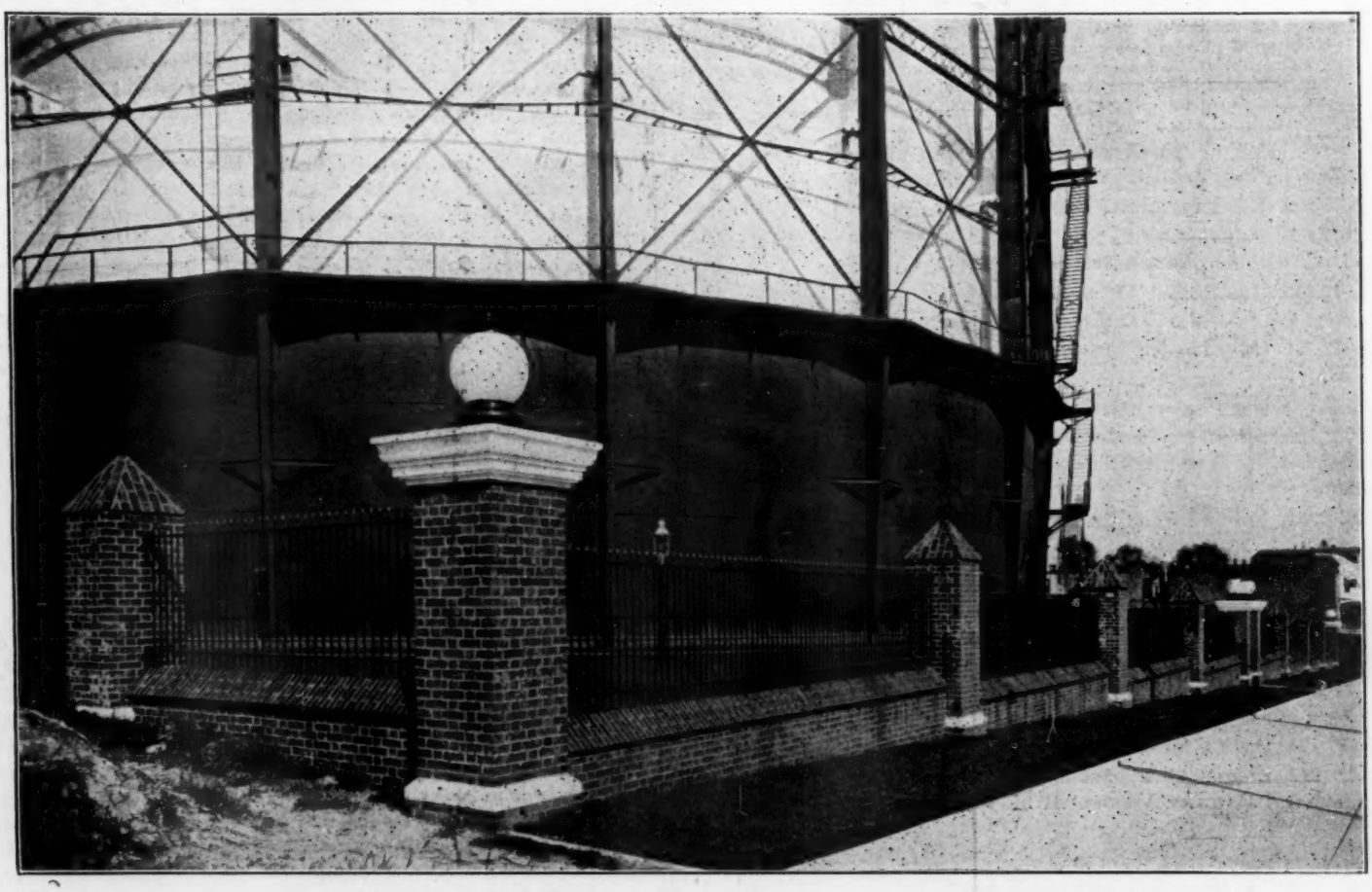
New Methods and Appliances.

SOMETHING ABOUT THE J. G. WHITE ENGINEERING CORPORATION.—With the announcement of the appointment of Mr. Edward J. Nally, formerly Vice-President and General Manager of the Postal Telegraph and Cable Company, to a like place in the Marconi Wireless Telegraph Company of America, it is learned that the latter Company has just made a contract with the Norwegian Government for the erection of a wireless station in Norway connecting with a station in Massachusetts, which service will make another link in the chain of Marconi stations which are being planned to give wireless service throughout the entire world. The Marconi Company has purchased sites for the proposed station on the Massachusetts Coast, and plans to erect the duplex system, by which wireless messages can be received and sent at the same time. The operation of the system will be on a similar plan to that to be employed between the station now building between New Brunswick and Belmar, in New Jersey, and the new station in England. The Norwegian Government is at present making arrangements, according to Secretary Bottomly of the Marconi Company, to connect with Sweden, Denmark and the north of Europe. It is estimated that each wireless strtion will cost in the neighborhood of $500,000. Direct wires from the stations in Massachusetts will transmit the messages to New York and Boston. Besides the new system between America and Norway, Mr. Bottomly declares that the Company proposes to connect the United States with Honolulu, by two stations to be erected in California, at Bolinas and Marshalls. Contracts have been awarded to the J. G. White Engineering Corporation, of New York, for the construction of the receiving and sending stations in New Jersey, California and the Sandwich Islands. This system will be extended eventually to Japan and the Phillipines, the stations already being prepared in the former place, but so far the Company has been unable to get any concessions from the Government for stations in the Phillipines. It has also planned a wireless system connecting Europe and the United States with South America. The President of Brazil recently signed a concession for a period of 50 years, and every effort will be made to erect the necessary stations in the shortest possible time. A station will be constructed at Para, connecting with New York, to be followed by a network of stations opening up cheaper telegraphic communications between the South American Republics, the United States and Europe. These stations will be followed in a short time by a system for wireless communications with Australia, New Zealand, Egypt and India, until wireless messages may be sent to and from all parts of the globe. Mr. Nally, who has been appointed Vice-President and General Manager of the Marconi Company, is still in his prime and will be especially valuable to the Company in connection with the Transatlantic and Trans-Pacific telegraphic service, which it is expected will be open to the public by the close of the present year. He has been for more than 35 years in the telegraph businesss, starting as a messenger boy with the Western Union Telegraph Company, working his way up to the Vice-Presidency and General Managership of the Postal Telegraph Company, from which he has just resigned after a service of nearly 25 years.

THE COON RIVER HYDRO-ELECTRIC DEVELOPMENT.—Construction on the Coon Rapids hydro electric development on the Mississippi river, near Minneapolis, Minn., is being pushed rapidly by the engineers and constructors, Messrs. H. M. Byllesby & Company. A force of 700 men is now engaged on the dam, which it is planned to complete by December. It will have an initial installed capacity of 10,000-horse power, in 5 units, and an eventual capacity of 14,000-horse power, instead of 12,000-horse power as first reported. It will supplement the resources of the Minneapolis General Electric Company, the business of which has increased rapidly the past year. The dam (of solid concrete, reinforced), has been built so far under exceptionally favorable circumstances, the anticipated June rise in the Mississippi river not materializing. The construction camp with its hospital, water supply, electric lighting and moving picture show, has been declared a model by visiting engineers. The last improvement is the inauguration of a public school for some 25 children living in camp with their parents. A teacher was provided by the county authorities and was opened on schedule, September 2d. The bonds of the Northern Mississippi River Power Company, the Company owning the development, were purchased some time ago by Bachman & Company, of Philadelphia.

Modern Lamp Standards and Gas Lamps.—That the matter of advancing the art of evolving handsome and useful standards for gas lamps (as well as the lamp type itself) is going finely may not truthfully be denied.

Following our presentation (issue of the 22d ult.) of the new type of gas arc lamp as used on the Tampa (Fla.) Parade-Driveway, we herewith present an illustration of the plan-design (carried



out by the direction of one of the best-known works' engineers in this country) adapted in the inclosing of a large holder at one of the United Gas Improvement Company's storage stations in Philadelphia, Pa. The illustration so completely tells the story that further (or any) explanation is not required. Our authority, by-the-way, thus remarks: "It has seemed to me for some time that there was much apathy on the part of designers of new and attractive types of gas lamps and ways of placing these; and I think it a good plan to main tain the interest, as you can do."

Fig. 1.

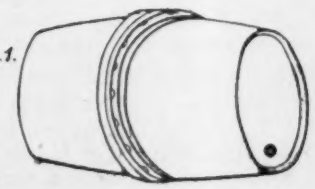


Fig. 2.

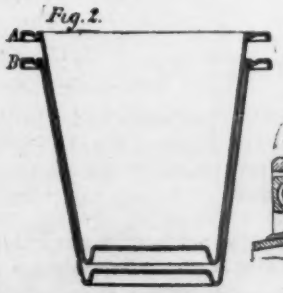
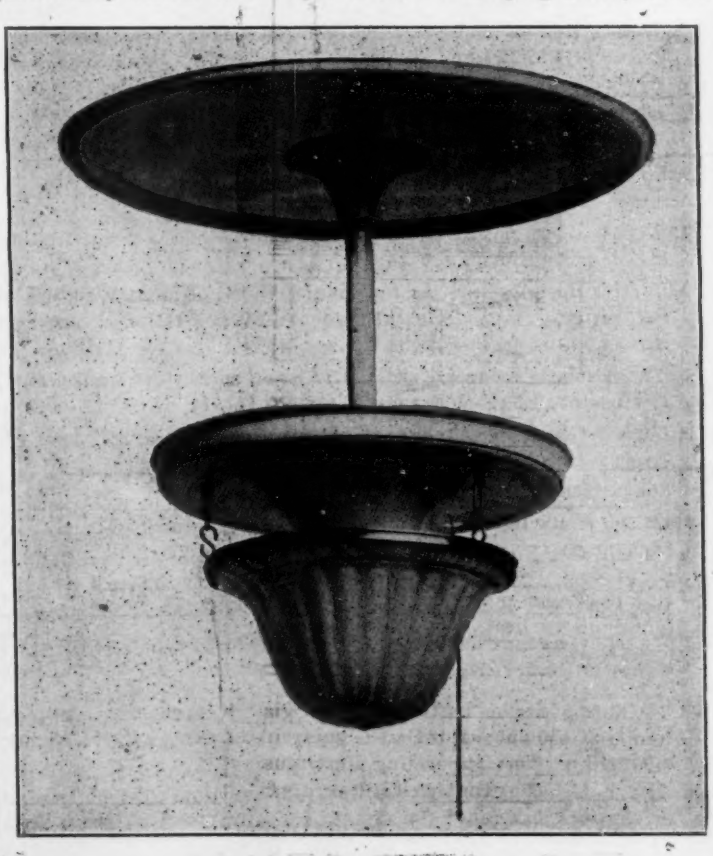


Fig. 3

Sectional Steel Barrel.—This interesting form of steel barrel has been developed in England. It is made in halves, bolted together, with a ring of packing between the flanges, the bolt heads and nuts being protected by the channel flanges. The principal claim for these barrels, besides their strength and low first cost, is the possibility of nesting them, as shown in Fig. 2, for storage or shipping as "empties."

The Humphrey Semi-Indirect System of Lighting.—After much persistent work, Mr. A. H. Humphrey, whose native genius seems inexhaustible, in fact to grow greater the heavier the drain that is made upon it, announces (or, rather, the General Gas Light Company announces) that a great step forward has been taken in the instance of indirect lighting by means of gas. The Company, in any event, is putting on the market a lamp (shown in the accompanying illustration), commercially known as the "Humphrey Semi-Indirect No. 30," the simplicity of which is shown in the design. In fact, it is really the Company's approved No. 30 style of burner "in a new housing." The "Diffuso" glass, acting in conjunction with the white porcelain reflecting surfaces, can be certainly depended on to yield a light soft in appearance and excellently diffusive. As the initial circular descriptive of the lamp remarks: "Every office of a gas company should have an equipment of these lamps for its accounting division, the shadowless light being particularly restful to the eyes of the bookkeeping force;" and it



will further assist to educate visitors to such offices in the satisfactory lighting effects obtained at a cost which puts electric currents on illuminating account altogether in the shade. The Humphrey Company will be pleased to answer all inquiries respecting the "Semi-Indirect, 'No. 30.'"

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,072,536. Gas Producer. H. F. Wallmann, Chicago, Ills.

1,075,578. Gas Furnace. P. A. J. Cousin, Nord, France.

1,072,582. Gas Range. W. Denby, Chicago, Ills.

1,072,603. Automatic Gas Shut-Off Valve. I. Glanschnig, Chicago, Ills., assignor of one-half to W. Hatzfeld, same place.

1,072,615. Gas Burner Valve and Lighter. J. Holtzman, New York city, assignor of one-half to J. Lisken, same place.

1,072,731. Coke Loader. P. R. Jordan and W. Wright, Adamsville, Ala.

1,072,780. Gas Heater. G. E. Sharpe, Steubenville, O.

1,072,781. Inverted Incandescent Gas Burner. V. H. Slinack, Philadelphia, Pa., assignor to Pennsylvania Globe Gas Light Company, same place.

1,072,961. Igniter. C. B. Lambert, New York city.

1,072,993. Incandescent Lamp. C. Reiss, Berlin, Germany.

1,072,998. Automatic Gas Lighting and Extinguishing Mechanism. A. B. Shaw, West Medford, Mass., assignor to Automatic Gas Lighting Equipment Co., Boston, Mass.

1,073,108 Process of Burning Natural and Other Gases. B. E. Eldred, Bronxville, N. Y., assignor to Combustion Utilities Co., New York city.

1,073,124. Gas Producer. J. A. Herrick, New York city.

1,073,247. Process of Producing Sulphate of Ammonia from Ammoniacal Gases or Vapors. H. Koppers, Essen-on-the-Ruhr, Germany.

1,073,258. Closure for Gas Purifiers. E. F. Lloyd, Detroit, Mich.

1,073,259. Gas Scrubbing Apparatus. E. F. Lloyd, Detroit, Mich.

1,073,420. Mechanism for Producing Gas Lighted Flash Signs. T. Jackson, London, England, assignor to himself and to A. Ramsay, Chesham, England.

1,073,605. Method of Removing Impurities from Coal Gas. G. H. Hultman, Stockholm, Sweden.

1,073,620. Method of Treating Particles in Suspension in Gas Currents. T. F. Murray and C. B. Grady, New York city, said Grady assignor to said Murray.

1,073,621. Device for Trapping Particles in Suspension in Gas Currents. T. F. Murray, New York city.

1,073,843. Illuminating Liquefied Gas and Method of Treating Gases. H. Blau, Augsburg, Germany.

1,073,919. Rectangular Gas Producer. R. B. Mildon, Wilkinsburg, Pa., assignor, by mesne assignments, to The Colonial Trust Co., trustee, Pittsburgh, Pa.

1,074,032. Gas Producer. C. H. T. Alston, county of Chester, and P. T. Houston, London, England.

1,074,042. Gas Generator. J. W. Bodyfield, Hot Springs, Ark.

1,074,090. Device for Controlling Valves of Gas Burners. A. B. Shaw, Medford, Mass.

1,074,100. Detachable Gas Fitting. R. Behr, Kolberg, Germany.

1,074,110. Gas Burning Apparatus. P. Fyfe, Glasgow, Scotland.

1,074,132. Safety Gas Controller. S. L. Neely and W. A. Mineo, Edmond, Okla.

1,074,136. Gaseous Fuel Mixer. W. S. Parker, Philadelphia, Pa., assignor to Parker Mfg. Co., same place.

1,074,157. Burner. A. Beler, Pittsburgh, Pa.

1,074,211. Automatic Shut Off for Gas Burners. C. H. Schenk, Springfield, Ills.

1,074,312. Gas Heater. W. Collins, College Point, N. Y., assignor to Stamford Gas Stove Co., Stamford, Conn.

Items of Interest
FROM VARIOUS LOCALITIES.

WE are informed that ferox is now being mined and manufactured on the Pacific Coast. Messrs. W. F. Boardman & Co., of San Francisco, the representatives of many Eastern manufacturing concerns, will act as the agents of the Consolidated Gas Purification and Chemical Company.

"B. G.," writing from Grand Rapids, Mich., says: Mr. John A. Patten has been appointed General Manager of the Elkhart (Ind.) Gas and Fuel Company, succeeding Mr. Frank R. Flynn, effective the 1st inst. Mr. Patten was for some time General Manager of the Winona (Minn.) Company, but during the past year has been engaged on extension work for the American Public Utilities Company in Salt Lake City, Utah, and La Crosse, Wis. It was the intention of the American Public Utilities Company to transfer Mr. Flynn to the home office in Grand Rapids, to have him devote himself to the commercial business of its various properties, particularly along industrial lines. He, however, has had another recent (and very attractive) offer, which he is seriously considering, accordingly his location, subsequent to the breaking-in of Mr. Patten, at Elkhart, is to some extent uncertain.

MESSRS. SLOAN, HUDDLE & CO., of Madison, Wis., have been reorganized, under the name of Sloan, Huddle, Feustal & Freeman, in order to conveniently handle their growing business. They will, of course, continue as "Consulting Engineers and Public Utility Experts," with offices in Madison (as before), and also in the Hume-Mausur Building, Mr. Huddle being in charge of the Indianapolis division of their offices.

THE gas service at Joliet, Ills., was threatened recently by a "conflagration of a nature so serious that the generating station of the Western United Gas and Electric Company was almost put out of business." So read the press despatches in and around Chicago the night of the 3d inst. It is true that the coal elevating plant of the Company at Joliet was badly messed up by a blaze; but the current gas supply was never endangered. By the way, it seems the fire resulted from spontaneous combustion, wherefore we again call attention to the Brown Hoisting Machinery Company's installations on coal storage account recently completed in Indianapolis, Ind., for the Indianapolis Light and Heat Company.

"B. B. S.," writing from Jacksonville, Fla., incloses this mention: "Soon after the election regarding the proposed issue of city improvement bonds, the voters of St. Petersburg, Fla., will be called upon to vote on the matter of erecting and operating a gas plant on and for municipal account. This latter vote will likely be taken during the November election."

THE New York *Journal of Commerce* says that recent advices from Philadelphia are to the effect that stockholders of record in the American Gas Company (as of the 4th inst.) will have the right to subscribe to a new issue of stock at par to the extent of 20 per cent. of their present holdings. The payments are thus arranged: In full, on or before October 31; or 50 per cent. October 31st and 50 per cent. December 1st. The right to subscribe expires October 31. The authorized capital stock of the American Gas Company is $7,500,000, with a par value of $100 a share, of which amount 44,585 shares are outstanding. The 20 per cent. allotment will amount to 8,917 shares increasing the total amount outstanding to 53,502 shares. The proceeds from the sale of the new stock ($891,700) will be expended in improving the physical condition of the properties."

THE California State Railroad Commission has assented to the petition of A. A. Webber, and associates, of Los Angeles, for the right to construct and operate a gas plant in the limits of the settlement known as Fowler.

THE Stacey Manufacturing Company will construct 2 gas holders for the Procter-Gamble Company, of Cincinnati. They are for the storing of hydrogen gas, and are to be erected on the Ivorydale section of the Procter-Gamble properties, Mill Creek, Ind. One of the vessels will be 83.6 diameter, by 125 feet in height, with a rated capacity of 300,000 cubic feet; the other will be 73.6 in diameter by 73 feet in height, with a capacity of, say, 100,000 cubic feet. The Procter-Gamble folks will also construct 4 oil storage tanks, at the

crossing of Este and Spring Grove avenues, just north of Mitchell avenue.

MR. W. W. FREEMAN formerly well known from his long, active and successful connection with the Vice-Presidency of the Brooklyn (N.Y.) Edison Company, has been appointed Vice-President (which carries with it the active management) of the Columbia Gas and Electric Company, of Cincinnati, O., which corporation owns the Union Gas and Electric, the Cincinnati Gas and Electric, the Cincinnati Gas Transportation, the Union Light, Heat and Power, the Newport (Ky.) and the Covington Light and Traction Companies, besides several other companies that are co-related and nearby public utilities concerns. It has 125,000 consumers of gas and 30,000 separate users of electric currents. His start and progress in business life are well illustrative of what a capable youngster can accomplish. He started out in Brooklyn, N.Y., when a lad of 17 (1889), with the Brooklyn Edison Company, as stenographer and private secretary to its President, and he is now the active man of one of the greatest lighting corporations in the world. Queer to say, he is a member of possibly 20 lighting organizations, not one of which is representative of the gas industry. However, it is not yet too late to correct that unfortunate condition; and, being naturally a progressive sort, if he will join the American Gas Institute, having attended its Richmond (Va.) Convention this week, there he will have a chance to comprehend how "big a thing" the gas business really is. These electrically educated youngsters are lamentably deficient in respect of their ancient co-partner's scope or strength, unless it be those who have tried the scheme of "Just simply wiping out or up the gas company!" Yes; we've heard some of these "wipers;" and we know what happened them. Nevertheless, all possible good luck to Mr. Freeman, who certainly was well liked "When in these parts."

MR. W. D. RAY, Manager Northern Indiana Gas and Electric Company, has been elected Vice-President of the Indiana Electric Light Association.

MRS. CARROLL, at the instance of the New Jersey Public Service Gas Corporation, in its Trenton division, gave, during the first week of this month, a series of her "graphic talks," on the uses of gas for culinary purposes. It is needless to say that she held the attention of her audiences, which were not only large but comprised representatives of many of the most prominent families in Mercer county.

"OUR sons their fathers' fading footsteps see; and such as Chaucer was shall Dryden be," so wrote a great Englishman scores of years ago; and your scribe (whose days in the gas industry go back in unbroken ticks for many years) would say that perhaps this is better illustrated practically in the gas business than in any other trading line. At any rate I can name 100 instances that are on record in the last 20 years in which the sons took up the burden where the fathers laid it down. The latest prominent example in respect to this is furnished in the recent meeting of the shareholders in the Municipal Gas Company, Albany, N. Y., where Mr. Nicholas F. Brady, the eldest son of the late Mr. Anthony N. Brady, was elected to succeed the latter on the Directorate of the Albany (N. Y.) Municipal Gas Company. Further (the Directorate having been increased to 9 from 7 members) Mr. James C. Brady and Mr. E. Palmer Gavit (son-in law of deceased) were chosen to serve as the additional members. These, with Messrs. J. B. McEwan, R. C. Pruyn, Jno. Bowe, E. B. Cantine, Jno. A. Delehanty and Chas. Gibson, constitute the Board. Meanwhile Mr. Pruyn (Vice-President) is the *interim* Acting President.—L. MC."

THE Brooklyn Borough (N. Y.) Gas Company, which serves the residents of the Thirty-first Ward and Coney Island complete, reduced its selling rate to 95 cents per 1,000, which, according to the ruling of the Public Service Commission, will remain undisturbed until December 31, 1914.

MAYOR KEEFE and the City Council, of Nelson, British Columbia, have agreed upon $50,000 as the purchase price of the Nelson Gas Company, the seller being the Economical Gas Apparatus Construction Company, of Toronto, Ontario. The active consideration will be $50,000, fifty-year, 6 per cent. bonds. The authorities, as it seems to us, certainly secured a bargain.

"B. S. R.," writing from Cambridge, Mass., under date of the 6th inst., incloses this: "The new office building of the Cambridge Gas Light Company, corner Massachusetts avenue and Temple street, recently occupied by the Company as headquarters, is the largest structure on the avenue devoted to the business of one corporation. The building, of 2 stories and a mezannine, is 62 feet by 122 feet, is of steel and limestone, the architecture being of the Italian renaissance type. The main office (ground floor) is 32 feet by 81 feet, and 24½ feet high. This is really a beautiful room, and carries the display section and meter division, the sales' section, the President's offices and the clerical departments. On this floor, too, and the mezannine floor, are stock, photometer and calorimeter sections, an auxiliary business office and the banking vaults. The second floor is given over for general storage purposes. The basement carries a fine demonstration floor, work room for the fitters, wash rooms, shower baths, lockers and freight elevators. The building is heated by steam, and its covering in is constructed to show fully the advantages of gas lighting as an aid to ventilation. The exterior illumination is on a scale to cause the front and accompanying promenade to be the most attractive front of building and stretch of walk in this beautiful Boston suburb. Six high-powered lamps, 4 on Massachusetts avenue and two on Temple street, are the vehicles. The building and its furnishings represent an expenditure of $200,000."

AND the expected came to pass; but, if investors will not retain competent men to look after such things, they most assuredly will pay for their laxity. All of which is introductory to this paragraph that was sent us by way of Redding, Cal., under date of October 2d: "The Balakala smelter plant, at Corona, was shut down last week, and virtually the entire force was laid off. The tryout of the Hall process" [process, hear ye!] "plant cannot be made in the generating plant, because of defects. Crude oil does not make the right kind of gas." [Did it ever do so, *a la* Hall?] "F. M. Leland, General Manager, will leave for the East in a day or so 'to consult' with the officials of the Company. Leland says he will return soon" [soon, mind you] "and is confident the defects in gas generating can be corrected." [Can, not will d'ye see?] "The temporary shutdown at Corona is disappointing, as it was thought the smelters would run to nearly full capacity."

MR. L. S. BOGGS, for a twelvemonth General Manager of the Macon (Ga.) Railway and Light Company, also assumed the management of the Macon Gas Company, effective the 1st inst. He succeeds Mr. R. M. Redding, who is to engage in business on personal account. Mr. Samuel Hatfield takes the place of Purchasing Agent to the Macon Gas and the Macon Railway and Light Companies. Two new offices (those of Assistant to the Manager, Macon Gas Company, and Assistant Manager to the Macon Railway and Light Company) will be filled respectively by Mr. F. S. Neely and Mr. M. L. Corbett.

"K. O. R.," writing from Wenatchee Valley, Col., under date of October 4th, forwards this: "Last week the Central Washington Gas Company formally accepted the plant built for it by the Cruse-Kemper Company, of Philadelphia and Ambler, Pa., and released the contractors. It is noteworthy that the contract specified November 1st as the completing time; but, harking to the urgings of the Gas Company, the contractors anticipated the completion time by virtually six weeks. The Company expects to begin service the 15th inst., and as a special inducement for consumers to get in their services as speedily as possible, no charge will be made for gas supplied between Oct. 15th and Nov. 1st. The expectation is that 325 will be hooked up to the main system, which now has a total operative mileage of 12, none of which is less than 3 inch. On the main business streets mains are laid in on each side, and that part of the work was done by W. W. Hess, of Philadelphia, and Young & Boral, of the same city. The gas generating system was furnished by the United Gas Improvement Company, under the direction of Mr. J. Frank Seeman. The gasholder (50,000 cubic feet capacity) was from the Cruse-Kemper shops, and the oil tanks (16,000 gallons capacity) were also erected by them. The Cruse-Kemper Company's 'men on the job' were Mr. S. E. Fairchild, Jr., ably abetted by his clever field representative, Mr. E. S. Clower. The new concern is owned by the Central Washington Gas Company (incorporated April 5th, 1913), and is a subsidiary corporate interest of the Wenatchee Valley Gas and Electric Company. Its officers are: President, Arthur Gunn; Vice-President, J. H. Stout; Second Vice-President, George D. Brown; Treasurer, R. O. Kennedy; Secretary, Fred. M. Crollard—all first class men. What do you think of the above as a record? Take it from me, if the Cruse-Kemper folks are in need of any 'boosters,' just refer such enquiries to us."

The Market FOR GAS SECURITIES.

The only change to note in Consolidated is a nominal break in it of a point or so, for which decline there is no reason whatever. The opening to-day (Friday) was made at 130½ to 132, and transactions in the shares were to all intent nil. There was good inquiry for city gas bonds, particularly the New York and East River firsts.

Brooklyn Union is 126 to 130, and these shares are also lifeless; that is, as to market happenings. But a likelier or livelier money earner is not in the industrial list. A special meeting of the shareholders in the Brooklyn Borough Gas Company is set for the 21st, at which the proposal to increase the capital stock to $1,000,000 from $500,000 will be voted on. There is little doubt that the "ayes" will have it, for the expenditures on plant account, especially in respect of distribution, during the past 2 years, have easily gone into six figures. The situation in Chicago is clarifying. The statement that the Ogden Company is to lose its individual identity is authoritatively denied; also, that Peoples Gas and the Insull electric interest are to be merged.

It is, nevertheless, true that it is likely Mr. Insull and Messrs. Mitchell and Patten are to hereafter help in shaping the affairs of the Peoples Company. Hence one may safely assume that hereafter there will exist a "true community of interest" between the gas and Edison interests. Indeed, it is much more than a possibility that Mr. Insull will be a potent factor.

Mr. Nicholas F. Brady has succeeded his father as President of the Municipal Gas Company, Albany, N. Y., and Mr. E. Palmer Gavit succeeds Mr. Robert C. Pruyn as Vice-President, the latter becoming Chairman of the Board.

Washington (D. C.) gas is again in the ascending scale, 426½ being bid for it. U. G. I. is 169 to 170; and Montreal Light, Heat and Power is 212 to 212½.

☞ Reference to our advertising columns will show that the American Light and Traction Company has declared these dividends all payable the 30th inst.; 1½ per cent. on the preferred; 2½ per cent. on the common; 2½ shares on each 100 shares of common. The books close in respect of these payments between the 14th and 30th insts.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

OCTOBER 13.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	130½	132
Central Union Gas Co. —				
1st 5's, due 1927, J. & J.	3,500,000	1,000	101	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,500,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	59	63
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100¼
New York and East River —				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	96	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	105	112
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	91	96
The Brooklyn Union	15,000,000	1,000	126	130
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	999,650	500	120	—
Out-of-Town Companies.				
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47¾	50
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co.,				
1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of				
New Jersey	10,500,000	—	130	133
" Bonds, 5's	10,500,000	—	104	106
Indianapolis	2,000,000	—	85	90
" Bonds, 5's	2,650,000	—	90	93
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co.,				
of Missouri	5,000,000	100	—	88
Bonds, 1st 5's	3,822,000	1,000	98½	99
Laclede Gas Co., St. Louis.	10,000,000	100	98	100
Preferred	2,500,000	100	—	102½
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	130
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	92¾	93
Preferred	25,000,000	100	91¾	92
Montreal L. H. & P., Canada	2,000,000	100	212	212½
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	182	190
Peoples Gas Lt. & Coke Co.,				
Chicago	25,000,000	100	124	124½
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
Pacific Gas and Electric Co.	15,500,000	—	37	39
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	96	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
United Gas Imp. Co.	55,502,900	50	169	170
Washington (D. C.) Gas Co.	1,600,000	200	426¼	428¾
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, Richmond, Va., October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting————1914. Officers: President, A. A. Dion, Ottawa; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N. Y.; Secretary, C. H. R. Chapin, 29 W. 39th street. New York City.

Gas Meters.—Monthly Section Meetings; Grand Commissioner, Will. W. Barnes. East Orange, N. J.; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, W. H. Pettes; Secretary, G. E. Smith, Sipp Avenue, Jersey City, N. J. Philadelphia Section; Chairman, Stanley Grady; Secretary, H. E. Stiteler, Broad and Arch streets. Cleveland Section, Chairman, F. R. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, T. W. Jennings, Boston; Sec., F. K. Wells, 69 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman. Bethlehem Section, Truman Weithnecht, Chairman; Sec.-Treas., Truman Buss, South Bethlehem, Pa.

Guild of Gas Managers of New England.—Annual meeting, March, 1914. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914. Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, Cleveland, O., September, 1914. Meetings of Sections, monthly. Pres., Charles O. Bond; General Secretary, J. D. Israel, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March —— —— 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, Davenport, May 27, 28, 29, 1914; Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1913. ———— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association.—Annual meeting, September, 1914. Place, undetermined. Officers: President, H. W. Douglas, Ann Arbor, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1914; Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913. Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, St. Louis, Mo., May 19 and 20, 1914; Officers: President, E. L. Brundrett, Kansas City, Mo.; Secy-Treas., T. Clive Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914, Boston. Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Annual Meeting, July —, 1913, Asbury Park N. J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N. J.

Ohio Gas Association.—Annual meeting, February ——— 1914 Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City May, ——1914. President, F. E. Bowman, Ada; Secretary-Treasurer, H. V. Boze Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, Long Beach, Cal., September ——— 1914. Officers: President, C. S Vance. Los Angeles, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city.

Southern Gas Association.—Annual meeting, Mobile, Ala., April 4, 1914. Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May——— 1914, Galveston, Tex. Officers: President, G. H. Gifford, Fort Worth Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ———1914, Milwaukee. Wis. Officers: President, Ewald Haase, Milwaukee, Wis.; Secretary-Treasurer, Henry Harman Milwaukee, Wis.